DIGITAL LITERACIES OF ENGLISH LANGUAGE TEACHERS AND STUDENTS AND THEIR PERCEPTIONS OF TECHNOLOGY-ENHANCED LANGUAGE LEARNING AND TEACHING IN THAILAND

by

Pornnicha Weerakanto

A Dissertation Submitted to the Faculty of the

GRADUATE INTERDISCIPLINARY PROGRAM
IN SECOND LANGUAGE ACQUISITION AND TEACHING

In Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

2019

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Pornnicha Weerakanto, titled Digital Literacies of English Language Teachers and Students and Their Perceptions of Technology-enhanced Language Learning and Teaching in Thailand and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

Jonathon Reinhardt Date: 11/06/2018

Beatrice Dupuy Date: 11/06/2018

Christine Tardy Date: 11/06/2018

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director: Jonathon Reinhardt Date: 11/06/2018

STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of the requirements for an advanced degree at the University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this dissertation are allowable without special permission, provided that an accurate acknowledgement of the source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

SIGNED: Pornnicha Weerakanto

ACKNOWLEDGEMENTS

First, my big gratitude is devoted to the UTCC, which offered me a great opportunity and full scholarship throughout my graduate study in the USA. Then, my special thanks go to the UA and the admission board of SLAT program, which accepted me to the Ph.D. program in 2015 to become a wild cat citizen and now an UA alumna.

Obviously, this dissertation could not be successfully completed if I did not receive inspiring advice, tremendous assistance, sincere care and support from my wonderful advisor, Dr. Reinhardt. He is very smart, professional and dedicated teacher and advisor. His smart brain, sharp eyes and organized thinking tremendously supervised my dissertation writing in every step from brainstorming ideas, writing a research proposal draft, editing presentation slides and approving full final dissertation. I feel deeply grateful and thankful for his dedication, time and effort in helping me finish the dissertation within 3.3 years.

More specially, I would like to convey my appreciation and gratitude to two professors as my dissertation committee members, Dr. Dupuy and Dr. Tardy. They both were very helpful for giving me marvelous thoughts and suggestions to make my dissertation have better quality. In addition, I would like to thank Dr. Czerkawski as my Comps committee member, who is very kind and supportive and Dr. Ariew, who gives good advice to develop my critical thinking skills. Also, I am indebted for all knowledge and skills gained from attending the classes of SLAT proficient faculties. I feel happy to have known two wonderful SLAT program coordinators, Robin and Kelly, and trustworthy SLAT friends; Nat, Ying, Kristian, Essa and David. I also feel very grateful for all UTCC teachers and students who participated in my study especially three fantastic focal teachers, Bee, Sam and Ning. I also want to thank Miew, Apple, Jib, Dear and Jane for sharing food, laughter and joy while I lived in the US. Moreover, I am deeply grateful for my big brother and editor, Jim. He is nice, kind and super helpful. He actively helped edit the whole dissertation for me. Thank you very much indeed.

Thanks to the affordances of LINE and Facebook, I can feel love, warmth and close to my beloved family and friends from Thailand; especially Uncles Heng, Juo, Toey, Aunties Na, Jae, Pla, Aey, Fa, funny siblings, Nok and Tor, my best old friends, Dr. Fa, None and Toey, loving daughter, Nutty, the Feeling Good people: Nid, Rin, Jew, Toy, Nim, Nui, Pooh, Pang, Jom and the Gang of Six: Jum, Pu, Anne, Oh and Pat. More significantly, I feel very fortunate and special for being loved by Rob, my "perfect" boyfriend. He always cares for me, believes in my potential and supports me everything. Thanks a million.

I want to thank these wonderful people who always send me love, virtual hugs, and smiley faces. I want to say I wholeheartedly appreciate your time and support in advising me and cheering me up to get through all obstacles and challenges while I was taking an amazing and extraordinary doctorate journey in Tucson.

Last but not least, I feel very privileged to be the eldest daughter of Mom Janfong and Dad Suwit, who nurtured me with unconditioned love, great understanding and caring support. I would love to thank them for teaching me to be a fighter with perseverance and patience that it tremendously contributed to become a Ph.D. survivor today. I believe they are now smiling for me and very happy with my success at *somewhere over the rainbow*. Not even a day, I never think of them. As I promised with Dad on his last day, I would obtain a Ph.D. Without a doubt, this doctorate diploma belongs to him. I love you.

Finally, I would like to end with an inspiring quote of Walt Disney, *if you can dream it, you can do it.*

Like I did!

DEDICATION

To Daddy and Rob

TABLE OF CONTENTS

TABLE OF CONTENTS – Continued

TABLE OF CONTENTS – Continued

TABLE OF CONTENTS – Continued

TABLE OF CONTENTS – Continued

TABLE OF CONTENTS – Continued

TABLE OF CONTENTS – Continued

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES – Continued

ABSTRACT

Today, the phenomenon of emerging digital technologies has led to digital literacies that are essential in order to survive in the digital environment (Eshet-Alkalai, 2004). The role of language teachers has shifted towards developing these literacies (Leu et al., 2004) and they are expected to understand how to leverage digital technologies to assist digital natives to use them effectively (Prensky, 2001, 2010).

In response to a pressing call for teachers with advanced digital literacies and knowledge of integrating digital technologies into curricula to facilitate students' learning and improve their digital literacies (Bawden, 2008; Chun et al., 2016; Eshet-Alkalai, 2004, Kessler, 2013; Leu et al., 2004; Passey, 2011; Prensky, 2001, 2010; Reinhardt & Thorne, 2011; Stergioulas & Drenoyianni, 2011; Thorne, 2013), this descriptive study aims to assess the digital literacies of English language in-service teachers in Thailand and explore their perceptions of technology-enhanced language teaching (TELT) in order to see whether, and the extent to which, that call has been heard.

The study employed mixed research methods to discover how teachers and students use digital technologies for academic and non-academic purposes and find out their perspectives towards technology integration into curricula, including application. Additionally, the study explored teachers' evaluation on digital web 2.0 technology-enhanced activities that were aimed to promote their digital literacy skills. For triangulation purposes, the findings were based on teacher and student surveys, classroom observations, teacher interviews, student focus groups, and artifacts. More specifically, the cases of three teachers were explored in-depth to gain insight into the general state of digital literacy skills, using TPACK-DLT frameworks to analyze their survey responses and observing their classroom practices. Technological Pedagogical Content

Knowledge framework (TPACK) framework (Koehler & Mishra, 2009) is accepted as a reliable guiding principle for teachers to integrate technologies into their teaching (Koehler, Shin & Mishra, 2012; Mahdum, 2015; Pamuk, 2012). Digitally Literate Teachers (DLT) framework (White, 2015) is practical and clear to evaluate the digital literacy skills of teachers.

The overall results show that the concept of digital literacies was not clearly understood by the teachers. For that reason, they did not feel confident in integrating digital technologies into teaching although they believe the potentials of new technologies in motivating students in theory. Due to the lack of class preparation time, burdens of teaching loads, teachers' limited technology skills and students' low proficiency level, many teachers did not incorporate technology into curriculum as much as might be expected. Still, they believe it is necessary for students to have digital literacy skills. As teachers recognized their own digital competences were lower than students, they requested the university to offer technological training, faculty support, and a technology mentor.

Overall, the findings may raise awareness of practitioners, researchers, and policy makers towards their responsibility to gain a deeper understanding of digital literacies and to become digitally literate professionals in order to develop students' digital literacy skills, creativity, and critical thinking by becoming more comfortable with new learning platforms in the era of emerging digital technologies and ICTs.

CHAPTER 1: INTRODUCTION

This first chapter will describe the background of the dissertation, the rationale, the purposes of the study, the research questions and other necessary data. The chapter is organized into seven sub-sections as follows:

1.1 Background

1.2 Statement of the problems and the purposes of the study

1.3 Research questions

1.4 Researcher's positionality

1.5 Frameworks of the study

1.6 Definitions of terms

1.7 Outline of dissertation

1.1 Background

The development of digital technologies has massively shifted how the concept of literacy is understood and defined. Leu, Kinzer, Coiro and Cammack (2004) have claimed "new technologies generate new literacies" (p. 1607). Nowadays, teachers and students broadly use digital and mobile technologies in both formal and informal learning contexts, and this means learning can take place anywhere anytime (Traxler, 2005). Moreover, digital web 2.0 technologies, such as Facebook, wikis, and blogs expose students to broad authentic online resources and empower them to create digitally mediated texts (Paesani, Willis Allen, & Dupuy, 2015) in a gigantic globalized community to a degree that has never happened before. Accordingly, literacy is "a social practice" and should be recognized as "new literacies" (Lankshear & Knobel, 2011), "new media literacies" (Jenkins, Purushotma, Weigel, Clinton & Robison, 2009), or "digital literacies" (Bawden, 2008; Gillen & Barton, 2010; Reinhardt &

Thorne, 2011; Thorne, 2013). It should be noted that the definitions of all these literacy concepts are interrelated and overlap.

As the Internet has transformed old literacy to "new literacies" or "digital literacies", the nature of literacy has increasingly become more online than offline (Castek, Coiro, Hartman, Henry, Leu & Zawilinski, 2007). Castek et al. (2007) suggest that digital readers require strategies to make decisions "where to go and what to believe" (p. 4). They also need to be keen on "constructing meaning during online reading" (p. 4) in order to understand and analyze multimodal texts. Accordingly, language teachers should incorporate into their curricula learning strategies to deal with emerging technologies and increase student awareness of vernacular language use in social media to meet TESOL technology standards (Healey, 2018) and 21st century skill requirements (Marzano & Heflebower, 2011).

In response to evolving digital technologies and new definitions of literacies in an era of digitalized globalization, a plethora of new literacy studies (Chun, Kern & Smith, 2016; Dudeney, Hockly & Pegrum, 2013; Eshet-Alkalai, 2004; Kessler, 2013a; Kramsch, 2014; Lotherington & Jenson, 2011; Prensky, 2001, 2010; Willis Allen & Paesani, 2010) have called for a paradigm shift from teacher-centered approaches, grammar-translation methods, and communicative approaches to a pedagogy of new literacies. Prensky (2001) has urged teachers to change their traditional teaching methods and incorporate digital tools to match with new learning patterns of digital natives. Gillen and Barton (2010) and Thorne (2013) additionally have highlighted that digital literacies, which contain information literacy, media literacy and computer literacy, are needed to train students in formal education.

Moreover, as globalization has transformed language use, Kramsch (2014) urges a new understanding of foreign language (FL) educators. She suggests that there should be a dramatic

change to create "a more reflective, interpretative, historically grounded, and politically engaged pedagogy" (p. 302) to cope with the complexity of modernity*;* (dis)order in language use, (im)purity, and (ab)normality (Kramsch, 2014, p. 298). Chun et al. (2016) also have recommended that L2 teachers should teach learners to understand, interpret, and make meaning across technological media, such as chats, social networks, emails and blogs.

However, many studies have reported the recurring problem of inadequate information communication technologies (ICTs) skills on the part of teachers and their need for additional technological training (Dudeney et al., 2013; Hague & Payton, 2010; Hutchison & Reinking, 2011; Kessler, 2013b; Nguyen, Barton & Nguyen, 2015; Pang, Reinking, Hutchison & Ramey, 2015; Prensky, 2001, 2010; Strickland & O'Brien, 2013; Tan & McWilliam, 2009; Van De Bogart, 2012). Hutchison and Reinking's (2011) survey findings of 1,441 teachers across the United States revealed that the adoption level of ICTs was low, in spite of the fact, as Littlejohn, Beetham and McGill (2012) argue, that "literacies of the digital" put greater pressure on teachers to "prepare their students and their own organizational processes to thrive in an age of digital knowledge practices" (p. 547).

In response, Erstad et al. (2015) insist that it is "even more crucial now than before to prepare teachers to address these challenges, and to support them in both their professional development and their pedagogical practice" (p. 652). Bates (2015*)* argues there is an urgent need to develop teacher professionalism in a digital age and emphasizes the necessity of teachers' technological expertise. He suggests that quality teaching in a digital age comprises nine steps: (1) deciding how to teach; (2) knowing the course objectives; (3) working in a team; (4) developing existing resources; (5) mastering technology use; (6) setting appropriate learning goals; (7) designing course structure and learning activities; (8) communicating; and (9) evaluating and innovating

new teaching. Bates (2015) claims that all nine components are essential for 21st century teacher education programs.

Erstad et al. (2015) and Bates (2015) argue that teachers in the cyber age require innovative teaching approaches to cope with advancing educational technologies. Many studies (Baker & Jarunthawatchai, 2017; Chun et al., 2016; Erstad, Eickelmann & Eichhorn, 2015; Khamkhien, 2012; White, 2015) also agree that preparing teachers to teach digital literacies is urgent and crucial.

1.1.1 The Case of Thailand

In Thailand, social media and digital technologies play an important role in enhancing teaching and learning. Kitchakarn (2013) has found students significantly improve their writing when using blogs and a peer feedback, claiming that the students developed critical thinking and autonomous learning. Van De Bogart (2014) also discovers that the LINE chat application facilitates EFL class discussion and collaboration, and it creates a motivating and comfortable learning environment for Thai undergraduates. However, Khamkhien's (2012) study reveals the "failure of integrating CALL in English classrooms" (p. 59), caused by teachers' insufficient ICT knowledge to select appropriate technological tools, large class sizes, and teaching overloads. In contrast to Kitchakarn's (2013) findings, Lakarnchua and Wasanasomsithi (2013) discover Thai EFL students feel negative about using blogs because they are not familiar with their usage and encounter several technical problems. This indicates that more studies exploring Thai students' digital web 2.0 technology use and their perceptions of technology-enhanced language learning and teaching are needed to gain insight into the state of digitalized learning in Thailand. Overall, the literature supports the notion that digital technology should be more widely integrated into curricula in order to foster Thai students' digital L2 literacies.

As reported by Rukspollmuang (2016), Thailand formally promotes technology use for educational purposes, a policy which has been codified in the Thai constitution and national educational law. More specifically, the Thai government launched the Thailand Information and Communication Technology Policy Framework, or "ICT 2020" (2011-2020), and the National Digital Economy Master Plan (2016-2020), or "Digital Thailand". These plans aim to stimulate the digital economy and society and to develop "a digitally skilled consumer base" (Rukspollmuang, 2016, p. 13) in the use of digital technology. Recently, in early 2016, the Thai government approved "Thailand 4.0" as a leading policy framework, which promotes 3D technologies, Internets of Things (IoT), augmented and virtual reality, and robotics into industrial systems (Hongprayoon, 2016). For educational purposes, the policy focuses on ICT innovations to promote "Thai Citizen 4.0" as a self-regulated and active learner (Rukspollmuang, 2016).

Although many ICT initiative strategies have been launched, such as the "One Tablet Per Child (OTPC)" policy in 2011-2014, Rukspollmuang (2016) reveals that there are still insufficient ICTs skills and limited digital literacies of both Thai teachers and students. She adds that this challenge will affect "the achievement of agreed goals in the present Asian ICT Masterplan (AIM) 2020 of the ASEAN region" (p. 19). Moreover, based on the 2016-2017 global competitiveness report cited in Hongprayoon (2016), Thailand was ranked 63rd among 138 countries regarding technological readiness. In addition, an OECD / UNESCO (2016) study revealed many problematic issues of Thai education, such as inadequate teacher education, lack of holistic strategies for teachers' professional development, teachers' administrative pressures, the poor infrastructure of ICTs, and teachers' lack of confidence and skills in using ICTs.

To address the demand of being a digital citizen following the new digital policy or "Thailand 4.0", there is a need to raise awareness of English language teachers towards the value of integrating digital technology into their curricula (Hongprayoon, 2016). The author recommends that it was important that English language teachers offer Thai students an opportunity in using digital tools to enhance new literacies. Thus, it seems necessary that future research should explore strategies that develop English language teachers' technological skills in applying digital technology effectively in teaching.

It seems that no research to date in Thailand has assessed the digital literacies of in-service English language teachers. There has only been one published study to date, that of Jongsermtrakoon and Nasongkhla (2015), which used a group investigation learning system for Open Education Resources to develop pre-service teachers' digital literacies in Information Ethics. Based on my own observation and knowledge, there is also little research that explores English language teachers' perspectives of technology incorporation into curricula. Additionally, Bunyakiati and Voravittayathorn (2013) call for qualitative studies to gain an in-depth understanding of iPad integration into instruction and its impact towards students' satisfaction. Theerathean and Srikulwong (2015) employ only a quantitative questionnaire to explore the perceptions of Thai university students and faculty members from various disciplines about iPad-enhanced pedagogy.

Therefore, there is a need for descriptive research that fills the gap of Theerathean and Srikulwong (2015)'s study exposed by exploring in depth the perceptions of English language teachers and students towards technology integration, in particular, the affordances and challenges of various digital technologies and social media besides iPads. To address the demand of being a "Thai Citizen 4.0", there is also a need to raise awareness of English language

teachers towards the value of integrating digital technology into their curricula. There is a need for teachers to develop their digital literacies and use digital technology to facilitate students' language learning. There is a need to spark the interest of practitioners, researchers, and policy-makers in finding strategies to improve the digital literacies of Thai citizens to fulfill the goals of the Thailand 4.0 policy.

1.2 Statement of the Problems and the Purposes of the Study

This dissertation aims to address the aforementioned needs by examining the problem that many Thai teachers of English are reluctant to incorporate technology in their curricula in spite of policy mandates that all teachers integrate new technologies into their classrooms to enhance students' digital literacies. To this end, the intention of this dissertation is to assess the digital literacies of English language in-service teachers in Thailand and their perceptions of digital technology integration into pedagogy. The ultimate goal is to raise awareness of the teachers towards the necessity of developing their own and their students' digital literacies by incorporating digital technologies and social media into their pedagogical practices.

This study's first objective is to explore the digital technology use of teachers and students for both academic and non-academic purposes and to investigate their perceptions of technology integration into curricula. The study uses two frameworks to assess the digital literacy skills of teachers: the Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009) and the Digitally Literate Teachers (DLT) framework (White, 2015). The TPACK framework is suitable as it offers reliable and comprehensible guidelines for teachers to integrate technology into their teaching (Koehler, Shin & Mishra, 2012; Mahdum, 2015; Pamuk, 2012). The DLT framework is clear, practical, and up-to-date for examining the digital literacy skills, confidence, and digital competences of teachers. In addition, it aligns with this dissertation's

purpose: encouraging teachers to become digitally literate professionals. This study also seeks the teachers' feedback on the usefulness and viabilities of digital technological resources.

1.3 Research Questions

Focusing on a Thai English language teaching context, the dissertation asks five research questions as follows:

1) What new digital technologies do in-service teachers and students use for academic and non-academic purposes?
2) What are in-service teachers' perceptions of how students use technologies for academic and non-academic purposes?
3) What are in-service teachers' and students' perceptions of technology integration into curricula?
4) How do in-service teachers' perceptions of how they and students use technology inside and outside of the classroom impact how they apply technology to their pedagogical practices?
5) How do in-service teachers evaluate the usefulness and viability of various digital technological resources?

Data collection includes five sources for triangulation purposes: teacher and student attitudinal surveys, teacher interviews, student focus group discussions, class observations, and artifacts.

1.4 Researcher's Positionality

The setting is the University of the Thai Chamber of Commerce (UTCC), where the author taught for two years before receiving a scholarship from this university to obtain a Ph.D. at the University of Arizona in the U.S. Thus, the author has access and is welcome as a researcher to

collect the data. The author is also familiar with the university facilities and classroom environments. However, currently the author is a Ph.D. candidate and will receive a doctoral degree in a year. The author is aware that her academic status might make the teachers feel intimidated and uncomfortable because many do not hold a doctoral degree. The author is also concerned that her presence in the classroom as an observer may interfere with classroom dynamics because class observation is not a common practice in Thai higher education. In addition, based on the author's experiences in incorporating iPads and the iTunes U course management system into English courses, the author realizes that she should guard her pre-determined assumptions about the advantages and challenges of technology-enhanced language teaching. More crucially, after graduation the author will go back to Thailand to teach at this university and work with the participant teachers. Thus, the author is conscious of how her findings and interpretations from this study can affect the comfort of teachers and students as the participants of the study.

1.5 Frameworks of the Study

The theoretical frameworks that inform this study are the Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009; Koehler, Mishra, Kereluik, Shin & Graham, 2014; Koehler, Shin & Mishra, 2012; Koehler, Mishra & Cain, 2013) and the Digitally Literate Teacher (DLT) framework (White, 2015). After exploring the TPACK model in detail, it was found insufficient to assess teachers' digital literacies because it focuses on general technological skills of teachers and does not explicitly address how to evaluate specific digital literacy skills.

In response, the DLT conceptual framework was adopted to bridge a gap between technology and digital literacies. The DLT framework suggests seven essential strands of digital literacy

skills and issues needed by future teachers in the digital age. The digital literacy skills include skills and confidence in using digital technologies and development of creativity, criticality, responsibility, and productivity in order to efficiently cope with emerging social media and digital technologies. The seven components include 1) understanding a position as a digitally literate professional and the relationship between skills and practice; 2) recognizing learners' digital needs and abilities, and plan learning around the development of relevant digital skills; 3) selecting appropriate digital tools and seeking to use them creatively, critically and productively; 4) developing a critical approach to digital information and media while becoming more information literate; 5) forming and managing a professional digital identity and using it to engage professionally; 6) understanding and leading on digital safety, security, ethical and legal responsibilities, and citizenship; and 7) planning for continuous professional development and tracking digital trends. Making use of digital tools for reflection (White, 2015, pp. 23-25). Thus, the DLT framework is useful for evaluating to what extent teachers are able to understand digital literacy issues and themes, and to what extent they are able to use digital technologies in pedagogy.

1.6 Definitions of Terms

- **Digital Literacies (DLs):** refer to a list of skills and competences related to Internet searching, critical thinking, networking awareness, and an ability to understand dynamic texts, to communicate, and to evaluate the content (Bawden, 2008).
- **Digital Literacy Skills (DLSs)** are "the knowledge, skills, abilities, confidence, and competencies required to develop our usage of digital technologies. Development of critical thinking, creativity, responsibilities and productivity is facilitated and encouraged,

allowing us to use digital technologies for living, learning and work" (White, 2015, p. 18).

- **Technological Pedagogical Content Knowledge (TPACK) Framework:** refers to the interwoven nature of technology, pedagogy and content to suggest three overlapping bodies of knowledge: PCK (pedagogical content knowledge, TCK (technological content knowledge), and TPK (technological pedagogical knowledge), which create the central TPACK (technological pedagogical content knowledge). It is useful for teachers because they can use the TPACK principle as a guideline in order to incorporate technology in their instruction (Koehler & Mishra, 2009).
- **Digitally Literate Teacher (DLT) Framework:** refers to the seven competency strands for developing teachers' digital literacies to understand learners' needs and their use of technologies and teach students with confidence, creativity and criticality (White, 2015). Further information about the DLT's seven strands is elaborated in Chapter 2 in Section 2.3.

1.7 Outline of Dissertation

The format of this dissertation is a traditional monograph style including the following chapters.

Chapter 2: Literature Review discusses relevant literature which situates the current study within wider disciplinary conversations and identifies potential gaps in knowledge. The chapter content is divided into seven sections as follows:

2.1 Literacy, literacies, new literacies, media literacies, and digital literacies, emphasizing the definitions of literacy terms and provides a deeper understanding of literacy, literacies, new literacies, media literacies, and digital literacies.

2.2 Teaching with technologies and teacher education about digital literacies, focusing on the digital literacy skills of teachers, teacher preparation programs, and the potentials and challenges of integrating technologies into pedagogy.

2.3 Two theoretical frameworks in assessing digital literacies: TPACK and DLT, describing the detailed components of Technological Pedagogical Content Knowledge (TPACK) and the Digitally Literate Teachers (DLT) principles.

2.4 The potential of Web 2.0 technologies for digital literacy development, focusing on the studies which integrated many digital web 2.0 technologies, such as Facebook, web blogs, and digital storytelling into learning and teaching and the needs of Thai teachers and students' digital literacy development.

2.5 Digital literacies and CALL studies in Thai context and "Thailand 4.0" digital industry policy, explaining the literature on digital literacy skills, the understanding of Thai teachers and students towards digital literacies, the importance of the Thailand 4.0 policy, and its impact on English language instruction.

2.6 Mobile technologies, mobile learning and iPad-enhanced learning and teaching, focusing on the definitions of mobile technologies and the literature on mobile learning, especially the application of tablet computers or iPads. As teaching and learning at the setting is based on iPads, the research on iPad technology affordances and limitations was explored to provide insight of its usage.

2.7 The UTCC as an Apple distinguished school with iHybrid learning system, describing the profile of the University of the Thai Chamber of Commerce (UTCC) as the setting of this study. This section also presents the detailed descriptions of iHybrid learning system or iPad 1:1

and explains the university's goals and missions towards the new instructional approaches with the integration of iPads and iTunes U courses.

Chapter 3: Methodology presents the research design, the contexts of the study, data collection procedures, and data analysis. This chapter is divided into four sub-sections as follows:

3.1 Research design. It is the descriptive research, using mixed methods.

3.2 Context. The setting was the UTCC, Bangkok, in Thailand during the Spring 2018 semester. The data collection consumed nine weeks starting from January 8th to March 7th, 2018. The participants were 37 English language teachers and 58 EFL Thai university students from various years and programs of study. In addition to general aggregate data, the dissertation focuses on the cases of three teachers by exploring in-depth their digital literacy skills, digital technology use, and perceptions of technology integration into English curricula.

3.3 Study procedures and data collection. The data collection started with a pilot study of the teacher questionnaire. The data was collected from five sources: 1) two attitudinal surveys of in-service English language teachers and EFL Thai university students; 2) class observations of three focal teachers; 3) teacher interviews; 4) student focus group discussions; and 5) a review of artifacts of the three English courses and the researcher's reflective journals.

3.4 Data analysis. The quantitative data from the surveys were analyzed by descriptive statistics: mean score and percentage. An open coding strategy was used to interpret the open-ended responses in the surveys, teacher interviews and student group discussions. Also, content analysis was utilized for the artifact review.

Chapter 4: Research Findings and Analysis presents and summarizes quantitative and qualitative results of student and teacher as follows:

4.1 Student aggregate results. This section presents the students' background information, their digital technology use for academic and non-academic purposes, their perceptions of technology integration into curricula, understanding of digital literacy, and a summary of the students' findings and interpretation.

4.2 Teacher aggregate results. This section describes the teachers' background information, their digital technology use for academic and non-academic purposes, perceptions of students' technology use, perceptions of technology integration into curricula including application, evaluation of digital technological resources, understanding of digital literacy and a summary of teachers' findings and interpretations.

Chapter 5: A Case Study of Three Teachers presents the findings and interpretations of three teachers that it was divided into seven sections

5.1 Bee – "the thoughtful player". This section presents the findings, from the first of the three deep investigations, of a Thai teacher called Bee (a pseudonym) on the same measures as the teacher aggregate results.

5.2 Sam – "the cautious facilitator". The section shows the findings of the second teacher, an American male teacher, Sam, according to the same measures.

5.3 Ning – "the rigorous trainer". The section presents the detailed descriptions of the third teacher, a pioneer teacher for technology integration into her teaching, again using the same measures.

5.4 The three teachers' digital literacy competence informed by TPACK framework: the assessment results of the TPACK performance of Bee, Sam and Ning are described and compared to understand in-depth how the teachers incorporate technological, pedagogical, and content knowledge into their teaching practicum. There are eight sub-sections, which consist of

each of seven TPACK components (Technological Knowledge, Content Knowledge, Pedagogical Knowledge, Pedagogical Content Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, and Technological Pedagogical Content Knowledge), and a summary of individual TPACK components in comparison.

5.5 The three teachers' digital literacy competence informed by DLT framework: the DLT framework, which is expanded into seven strands, is used to assess the three teachers' digital literacy skills for teaching and their knowledge around digital literacy issues, such as digital citizenship, digital identity, and digital rights. The data presentation is shown in the form of score comparison. In addition, the general digital literacy skills of three teachers are presented in comparison.

5.6 A summary of the overall findings and interpretations. This section presents a general picture of all results from the seven sections that answers the five research questions.

Chapter 6: Conclusion and Implications discusses the findings in comparison to those from relevant studies, describes implications and limitations of the study, and suggests future research. This chapter is divided into six sections as follows:

6.1 Discussion. This section focuses on comparison between this dissertation findings and the relevant research according to six areas: 1) digital technology use for academic and non-academic purposes; 2) teachers' perceptions of students' digital technology use; 3) the perceptions of teachers and students about technology integration into curricular; 4) digital technological resources for teachers' digital literacy development; 5) digital literacy instruction; and 6) teachers' digital literacy informed by TPACK assessment and the proposal of a DPACK framework.

6.2 Implications of the study. This section emphasizes the practicality and usefulness of this dissertation for practitioners, teacher educators, researchers, and policy-makers in various aspects.

6.3 Limitations of the study. This section describes the problems of generalization of the findings, the selection bias, the limited number of participants, the limited time for data collection, and the researcher's positionality as an insider.

6.4 Suggestions for future research. This section presents some recommendations for new studies.

6.5 Contributions of the study. This section focuses on how the dissertation contributes to the literature on digital literacy, teacher education and technology-enhanced language teaching, and learning in Thai contexts.

6.6 Conclusion. The final section presents a summary of the dissertation's objectives and its results and concluding remarks.

Appendices present the matrix of the study, participants' information, teacher and student survey results, sample teacher interview questions, and sample student focus group questions. As the study's findings were collected from various sources, it is useful to present the survey results of teacher and student responses for the audience to have a deeper understanding of the researcher's interpretation.

References present all citations in this dissertation.

CHAPTER 2: LITERATURE REVIEW

This chapter discusses the review of relevant literature, which is divided into seven sub-topics as follows:

2.1 Literacy, literacies, new literacies, media literacies, and digital literacies

2.2 Teaching with technologies and teacher education about digital literacies

2.3 Two theoretical frameworks in assessing digital literacies: TPACK and DLT

2.4 The Potential of Web 2.0 technologies for digital literacy development

2.5 Digital Literacies and CALL studies in Thai context and "Thailand 4.0" digital industry policy

2.6 Mobile technologies, mobile learning and iPad-enhanced learning and teaching

2.7 The UTCC as an Apple distinguished school with iHybrid learning system

These topics are organized to follow this research purpose, which focuses on assessing digital literacies of English language in-service teachers in Thailand. Also, the study aims to raise the teachers' awareness in developing digital literacy skills and knowledge to respond to an urgent call from Thailand 4.0 nationwide policy. Thus, the selected literature puts an emphasis on teachers' digital literacies and their perceptions when incorporating technologies into teaching. In addition, in evaluating and developing teachers' digital literacies, it is essential to discuss TPACK and DLT theoretical frameworks and the affordances of web 2.0 technological tools in depth. Furthermore, the new government policy for educational reform as called "Thailand 4.0" is discussed to provide better understanding of the urgent needs of technology-enhanced language teaching and learning in Thailand. Mobile technologies, such as iPads are also discussed to study their impact on mobile teaching and learning in the age of emerging digital technologies. Last, the iHybrid learning system, infrastructure environment, and administrative

policies of the UTCC are elaborated to give insights of the setting of this study and teaching and learning environment.

Overall, the literature will provide grounded knowledge and deeper understanding about digital literacies, digital technologies and teacher education in the digital age for critical and solid interpretation and analysis. The following seven guiding questions are employed to explore those topics.

1) What are the definitions of literacy, literacies, new literacies, media literacies, and digital literacies?
2) What does the research on teaching with technologies and teacher education about digital literacies offer to teachers' digital literacy competence and perceptions on technology integration into curriculum?
3) What does the research on TPACK and DLT frameworks offer to teachers' evaluation and their knowledge of technology, pedagogy and content as well as digital literacies?
4) What does the research on web 2.0 technology affordances inform us about developing digital literacies?
5) What does the research on digital literacies and CALL in Thai context and "Thailand 4.0" industry policy inform us about the current Thai educational system?
6) What does the research on mobile technologies and mobile learning facilitate today's learning and teaching?
7) What is the "iHybrid" learning system at the UTCC and how does it affect the paramount change of teaching and learning approaches and faculty members' perceptions?

2.1 Literacy, Literacies, New Literacies, Media Literacies and Digital Literacies

As my dissertation objective is to raise teachers' awareness of developing their digital literacies, it is essential to explore what literacy, literacies, new literacies, media literacies and digital literacies are. Moreover, it is worth discussing how different scholars similarly and differently define new literacies influenced by the Internet and evolving ICTs. Thus, a deep understanding of various literacy terms is needed here to find the value why literacy teachers should enhance their digital literacy competences, which is the goal of my research.

So, in this section, I divide the literature on definitions and concepts of literacies into three sub-sections.

2.1.1 The transformation from singular literacy to plural literacies

2.1.2 The congruent concepts of "new literacies", "media literacies", and "digital literacies"

2.1.3 The importance of teachers in new literacies classrooms

2.1.1 The Transformation from Singular Literacy to Plural Literacies

Literacy scholars believe that the traditional definition of literacy as reading and writing skills should been expanded and conceptualized as "literacies", because of their plurality and diversity, and because they are socially and culturally constructed. Many literacy researchers (Eshet-Alkalai, 2004; Chun, Kern & Smith, 2016; Bawden, 2001, 2008; Gillen, 2014; Hafner, Chik, & Jones, 2013; Jenkins, Purushotma, Weigel, Clinton, & Robison, 2009; Jones & Hafner, 2012; Kucer, 2014; Lankshear & Knobel, 2008; Reinhardt & Thorne, 2011; Thorne, 2013) have acknowledged the change from a traditional "literacy": reading and writing to the plural form of "literacies". Lankshear and Knobel (2008) stated that literacy is not only abilities to read and write, but skills to apply these abilities as social practices. The plurality of digital literacies occurs from the multiplicity of "digital literacy" and a sociocultural perspective of literacies as

social practices (p. 2). Especially, literacy practices in social networking contexts contain myriad, complex social symbols. Jones and Hafner (2012) also defined "literacies" as abilities to use media to participate in social practices, take social identities, and maintain various social relationships.

Kucer (2014) has argued that digital contexts have altered singular "literacy" into multiple literacies. Reading and writing cannot be perceived as a single literacy, which is merely associated with "letter-sound patterns, morphological features and the syntactic represented in the languages" (p. 4). In other words, traditional literacy has been shifted from the individual abilities of decoding and encoding texts to "literacy events, literacy practices, and literacy performances" (Kucer, 2014, p. 230). Like Lankshear and Knobel (2008) and Jones and Hafner (2012), Kucer (2014) also argues that literacies have become social practices, not individual acts of meaning making, as different groups use languages in different ways to serve different purposes. He proposes that literacy, which has become a socially dynamic and diverse act, comprises four multidimensional aspects: linguistic and other sign systems, cognitive, sociocultural and developmental dimensions.

Overall, it is now accepted that singular literacy has been transformed to plural literacies because literacies are multidimensional and connected to various social practices.

2.1.2 The Congruent Concepts of "New Literacies", "Media Literacies", and "Digital Literacies"

It is believed that the revolution of new information and communication technologies (ICTs) affects how people use language and changes the forms of communication (Chun et al., 2016; Kucer, 2014). Emerging technologies require new literacies (Leu et al., 2004) that have been named and defined differently; for instance, "new literacies" (Chun et al., 2016, Lankshear &

Knobel, 2011; Leu et al., 2004), "media literacies" (Jenkins et al., 2009), and "digital literacies" (Bawden, 2008; Gillen & Barton, 2010; Lankshear & Knobel, 2008; Reinhardt & Thorne, 2011; Thorne, 2013; White, 2015). However, some of their definitions are closely interwoven. There are four main ways that they are interwoven: first, they include an element of criticality; second, they are shaped by digital technologies; third, they are complex; and last, they are connected to social practices and identities.

Definitional elements of "new literacies", "media literacies", and "digital literacies" overlap in certain ways. First, these three literacies include new technological skills, as well as creativity and critical thinking skills in order to find, evaluate and create digital texts. "New literacies" focus on critical thinking skills, which are essential to understand and interpreting freely produced online public information (Leu, Coiro, Castek, Hartman, Henry and Reinking, 2008). Leu et al. (2004) also stress the importance of "e-safety": being critical when using technology and learning to become safe online.

Similarly, Jenkins et al. (2009) proposed that "new media literacies" involve "research skills, technical skills, and critical analysis skills" (p. 19) to interpret visual and digital media and communicate in a collaborative, "participatory culture" (Kessler, 2013a). Stergioulas and Drenoyianni's (2011) concept of "media literacies" include critical thinking, creativity and active interaction in the media. Bawden (2008) stated that "digital literacies" are a list of skills and competences including Internet searching, critical thinking, networking awareness, the abilities to understand dynamic texts, and to communicate and evaluate digital content. (p.20). Likewise, Payton and Hague (2010) included critical thinking and evaluating skills, for example, knowing how to analyze, question and evaluate information as a component of digital literacies. White (2015)'s definition of "digital literacies" focused on the skills, abilities, confidence, criticality

and creativity of using digital tools.

Second, different types of digital technological tools that people choose can shape context and forms of language use. Kessler (2013a) stated that people tend to construct the new forms of language and information influenced by social networking and online media. Chun et al. (2016) also pointed out that the Internet and wireless technologies "inevitably affects language use" in socially, culturally mediated online spaces (p. 65). Digital technologies create new forms of literacies: "new literacies", "media literacies" and "digital literacies". Leu et al. (2004) and Leu et al. (2007) cited in Nicosia (2013) claimed that the powerful impact of new technologies required new literacies of Internet and other ICTs, which are called "New Literacy Perspective" (NLP). Leu et al. (2004) pointed out that technology generates new literacy practices whereas literacies also shape the forms and functions of technology. Thorne (2013) asserted that media technologies would drastically evolve and transform both formal and informal learning.

A plethora of scholars argued that using digital technology affects "digital literacies". Glister (1997) cited in Bawden (2008) defined "digital literacies" as the abilities to understand and use information from a wide array of digital resources that other fellow scholars expanded this core principle into multiple literacy skills. Martin and Grudziecki (2006) described "digital literacies" as awareness, attitude and abilities of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources. According to Lankshear and Knobel (2008), "digital literacies" involve "the use of digital technologies for encoding and accessing texts by which we generate, communicate, and negotiate meanings in socially recognizable ways (p. 258).

Likewise, Payton and Hague (2010) and Reinhardt and Thorne (2011) understood "digital literacies" in the similar ways that they encompass numerous skills of using digital tools. Payton

and Hague (2010) defined digital literacies as "the skills, knowledge and understanding that enables critical, creative, discerning and safe practices when engaging with digital technologies in all areas of life" (p. 21). Reinhardt and Thorne (2011) defined "digital literacies" as the application of Internet and digital technologies on the Web 2.0 platforms: social media and virtual gaming environments. Like Bawden (2001, 2008), Summey (2013) conceptualized "digital literacies" that they are abilities of "working intelligently with digital tools and data" (p. 13). Thorne (2013) linked "digital literacies" to semiotic practices afforded by electronic media that people use to learn, communicate and socialize in the online world.

Third, new literacies are complex and demand a number of digital competences. Lankshear and Knobel (2008) elaborated that the complexity of literacies was caused by using varying technologies to complete a task in "socially recognized ways". Leu et al. (2004) and Chun et al. (2016) argued that the new literacies are changing because new technologies emerge and the old ones disappear. Bawden (2001, 2008) emphasized that "digital literacies" include a number of literacies which are information literacy, computer literacy, ICT literacy, e-literacy, network literacy, and media literacy. Furthermore, Summey (2013)'s book "Developing digital literacies: a framework for professional learning" presented that digital literacies contain a set of 13 new literacies consisting of computer literacy, cultural literacy, game literacy, media literacy, multiliteracies, network literacy, social literacy, visual literacy, information literacy, and new literacy.

Thus, Leu et al. (2004) said it is essential to gain many types of strategic literacy knowledge, such as hypertext technologies to grasp new literacies. Martin and Grudziecki (2006) added that digital literacies are so complicated that they demand a person's life-long process to attain three levels of digital literacies: digital competence, digital usage and digital transformation. Digital

competence focuses on skills, concepts, approaches and attitudes whereas digital usage, represents parts of culture and a need for each situation that is the professional application of digital competence. Digital transformation involves innovations and creativity developed after the stage of digital usage. In addition, Kucer (2014) claimed that literacy processes are complex and "digital literacies are expanding our understanding of both the nature of text as well as text processing by drawing from work in media education and information and library sciences" (p. 3). As a result, he proposed four interrelated dimensions of literacies in order to understand the sophistication of new literacy processes. The four multidimensional concepts for teaching literacies include: 1) linguistic and other sign systems, such as print, sound, color and images to construct meanings, 2) cognitive, 3) sociocultural, and 4) developmental.

Chun et al. (2016) also raised a concern that the multimodality and multiplicity of new literacies can create complexity and misunderstanding. In other words, the new literacies are multifaceted and multimodal; therefore, people need multiple strategies to interpret and analyze them (Leu et al., 2004; Chun et al., 2016). According to Stergioulas and Drenoyianni (2011), "media literacies" involve "complicated process that consists of acquiring a new tekne, ability of art or craft" (p. 208). Jenkins et al. (2009) claimed new literacies are not related to individual competence anymore because they become socially involved. Accordingly, the authors believed that children required a number of media literacies to productively live in "a participatory culture" (p. 13) or the social media world. The "core medial literacy skills" include 11 competencies (p. 4) as following:

Play - the capacity to experiment with one's surroundings as a form of problem-solving

Performance - the ability to adopt alternative identities for the purpose of improvisation and discovery

Simulation - the ability to interpret and construct dynamic models of real-world processes

Appropriation - the ability to meaningfully sample and remix media content

Multitasking - the ability to scan one's environment and shift focus as needed to salient details.

Distributed Cognition - the ability to interact meaningfully with tools that expand mental capacities

Collective Intelligence - the ability to pool knowledge and compare notes with others toward a common goal

Judgment - the ability to evaluate the reliability and credibility of different information sources

Transmedia Navigation - the ability to follow the flow of stories and information across multiple modalities

Networking - the ability to search for, synthesize, and disseminate information

Negotiation - the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms.

Last, the "new literacies", "medial literacies" and "digital literacies" on the social media world are tied to the concept of social identity and social practices. According to Jones and Hafner (2012), "literacies" are skills of using media to communicate in social practices and play social identities. Kucer (2014) and Martin and Grudziecki (2006) clearly stressed that language is basically shaped by a social identity and social context. Each community forms particular guidelines that members follow and adopt to appropriately interact with other communities. Martin and Grudziecki (2006) argued that "digital literacies" represent the user's "identity" in a socio-cultural context. Likewise, Kucer (2014) said people have different sets of behavioral

"perspectives" or "group ideologies" because they belong to various social groups.

Likewise, Leu et al.'s (2004) NLPs includes the principle of collaboration: discussing each other's ideas for a social practice. Jenkins et al. (2009) also raised an awareness of media education that "new social skills and cultural competencies" are necessary for the age of the evolving new media environment. Payton and Hague's (2010) eight competence of "digital literacies" also paid attention to "cultural and social understanding": understanding own cultures and others and analyzing the influence of culture from media with critical interpretation. In addition, Chun et al. (2016) argued for "cultural know-how" to be literate in all modes. So, "new literacies", "media literacies", and "digital literacies" are socially, culturally situated practices. People from different groups use literacies distinctively.

Overall, the concepts of "new literacies". "media literacies", "digital literacies" are closely interrelated in several ways. First, they are multiple and complex. They require critical thinking skills and creativity. They are also influenced by digital technology use. Finally, they are associated with the sociocultural practices and the user's identity.

2.1.3 The Importance of Teachers in New Literacies Classrooms

As digital technologies continually change the forms of how we read and write, it seems more important than before that new literacy instruction will be useful for students to understand digital and multimodal texts in the age of advancing technologies. Chun et al. (2016) emphasized that the Internet and wireless technologies increase the use of new digital technologies, which "inevitably affects language use" in socially, culturally mediated online spaces (p. 65). So, multimodality and multiplicity of new literacies can create complexity and misunderstanding. Leu et al.'s (2004) NLPs principles stressed that "speed" is central to the new literacies. They said within a variety of technologies "the rate at which one can acquire, evaluate, and use

information to solve important problems becomes central to success" (p.1597). Therefore, teaching "new literacies" or "digital literacies" is essential to help students understand, analyze multimodal texts, and construct meanings in the world of emerging social media and ICTs.

Accordingly, many scholars agreed that teachers should design a new literacy pedagogy (Bawden, 2001; Chun et al., 2016; Cope & Kalantzis, 2009; Gonglewski & DuBravac, 2006; Jenkins et al., 2009; Kern, 2014; Kessler, 2013a; Kramsch, A'Ness & Lam, 2001; Kucer, 2014; Leu et al., 2004; Michelson & Dupuy, 2014; Payton & Hague, 2010; Prensky, 2010; Rowsell, Kosnik, & Beck, 2008; Rowsell & Walsh, 2011; The New London Group, 1996; Thorne & Reinhardt, 2008; White 2015). Bawden (2001) emphasized that it is vital for teachers to teach students some sets of "new literacies" rather than isolating any single set of strategies. Leu et al. (2004) gave an emphasis on the new important role of literacy teachers that they need adequate skills to teach new literacies to students who may be skillful in different technological tools. Jenkins et al. (2009) emphasized the necessity of teaching media literacy in order to "ensure that every child has the ability to articulate his or her understanding of how media shapes perceptions of the world" (p.18). The authors argued the important roles of schools and teachers to integrate "media literacies", which are social skills and cultural competencies in every curriculum because the change of media impacts our current life. It is crucial that teachers are responsible for "helping students develop the skills necessary for preparation within their discipline" (Jenkins et al., 2006, p. 57). Payton and Hague (2010)'s purpose was to encourage both students and teachers to "become digitally literate" (p.24).

Likewise, Prensky (2010) emphasized that students learned differently from the past and they wanted meaningful learning. New students become "deeply and permanently technologically enhanced connected to their peers and the world" (p.2). Thus, teachers should have expertise in

asking good questions, and giving students' guidance to augment their active learning with the use of technologies. Kessler (2013a) suggested that teachers should apply digital tools into their pedagogical practices within the sociocultural contexts. In addition, White (2015) believed it is essential for teachers to develop their digital literacy skills and competence to become digitally literate professionals in order to facilitate self-regulated learning of students in the digital world. He stated that teachers should be able to "identify, understand and teach the knowledge, skills and abilities required in order to become an engaged, critical thinking and creative citizens of the digital world" (p3) to become digitally literate. Accordingly, White's book (2015), "Digital literacy skills for FE teachers" is aimed at providing new teachers and educators a basic principle of digital skills for their professional development in order to apply them into their pedagogical practices.

In conclusion, it is now recognized that in the age of Internet, social media and ICTs "literacy has become multiliteracies, new literacies, or multimodal literacies" (Kucer, 2014, p. 3). Thus, literacy teachers and students need to continually develop consciousness of digital technology affordance and perils as well as criticality and creativity. Particularly, new literacy teachers should acquire digital literacies and have adequate social skills and cultural competencies to guide and coach young Net generation who appears to be "digital natives" (Prensky, 2001, 2010) to become digitally literate professionals.

2.2 Teaching with Technologies and Teacher Education about Digital Literacies

This section focuses on teachers' experience when they integrate technologies into teaching and the significance of teacher education programs about improving digital literacies. This review will provide insights about what challenges teachers encounter when using technologies

for teaching, how teacher education should be designed to develop pre-service teachers' digital literacies, and how teachers promote students' digital literacies.

To this end, I will divide the literature on teaching with technologies and teacher education about digital literacies into three sub-sections:

2.2.1 Teachers' struggles with technologies and need for technological training

2.2.2 Teacher education about digital literacies

2.2.3 New roles for teachers in student digital literacy training

2.2.1 Teachers' Struggles with Technologies and Need for Technological Training

A plethora of studies (Dudeney, Hockly & Pegrum, 2013; Hague & Payton, 2010; Hutchison & Reinking, 2011; Nguyen, Barton & Nguyen, 2015; Pang, Reinking, Hutchison, & Ramey, 2015; Prensky, 2001, 2010; Strickland & O'Brien, 2013; Tan & McWilliam, 2009) have reported that teachers encounter struggles and difficulties in operating technologies and that they need additional technology training. Chun et al. (2016) state that it is still perplexing for teachers in integrating Internet or web 2.0 technologies into pedagogy. Tan and McWilliam (2009) disclose that the teachers feel frustrated when using technology and find it is difficult to integrate technology in their classes. Additionally, Hutchison and Reinking's (2011) survey findings from 1,441 teachers across the United States reveal that teachers have difficulties in using technology even when they understand the importance of digital literacy. Dudeney et al. (2013) report that teachers struggle with technology use because they have insufficient technological skills, knowledge and training. They found students were more comfortable with technology use and could choose the technology much better than teachers. The authors (2013) made an intriguing claim that teachers from print-based generation know less than their students about the digital technologies. Moreover, Nguyen et al. (2015) found that teachers did not know how to

incorporate iPads to align with curricula in higher education. These studies align with Prensky (2001)'s statement that teachers are digital immigrants.

In view of these common findings, it seems necessary to prepare teachers to teach in the digital age (Erstad et al., 2015; Johnson et al., 2015; Kennistnet, 2011; Loveless & Williamson, 2013). Teacher professional development in 21st-century skills is more important and urgent than ever before (Erstad et al., 2015). Additional technological training is believed to develop teacher confidence in integrating technology into their teaching (Hutchison & Reinking, 2011). Johnson et al. (2015) assert that teachers should participate in professional development programs and gain assistance from technology centers in their universities prior to designing innovative learning activities for students. Teachers should learn new technologies by hands-on practices or from their students who are technological experts (Dudeney et al., 2013). Hutchison and Reinking (2011) also call for crucial support from administrators and policy-makers in providing professional development workshops for teachers.

In order to teach with technologies, teacher willingness and teacher positive attitudes towards technology are also important factors (Almekhlafi & Almeqdadi, 2010; Lee, Cerreto & Lee; 2010; Loveless & Williamson, 2013; Zhao, 2007). Loveless and Williamson (2013) argue that today teachers should be "ready, willing and able to teach in a digital age" and "make worlds for learning" (p. 138). Almekhlafi and Almeqdadi (2010) investigate 100 teachers' perceptions of technology integration at K-12 schools in United Arab Emirates and found that parents' and teachers' negative attitudes toward benefits of technology hindered technology incorporation into teaching and learning. Lee, Cerreto and Lee (2010) use theory of planned behavior (TPB) to explore Korean teachers' intentions to use computers to design and deliver teaching. They conclude the findings that attitude toward behavior (i.e., the better quality of teaching and

student achievement) impacts on teachers' intentions to use technology much greater than either subjective norm (i.e., school administration) or perceived behavioral control (i.e., reliable hardware and software, skills and training and support. Lee et al. (2010) suggest that teachers should have positive attitudes about using computers to create and deliver lessons. To develop positive attitudes and confidence and competence in using technology, Zhao (2007) argues for the potentials of offering technology integration training for teachers. The author reports the findings from exploring the attitudes and experiences of 17 social studies teachers after receiving technology integration training that most teachers that they are willing to use technology more often and more creatively.

In addition, teacher readiness and confidence of their technological skills positively affects technology use (Inan & Lowther, 2010; Kihoza, Zlotnikova, Bada, & Kalegele, 2016; Teo, 2008). Kihoza et al. (2016) report that most 206 tutors and teacher trainees at a teaching college in Tanzania encounter low pedagogical ICT skills and they are not ready to change related to technology use. Teo (2008) examines 139 pre-service teachers' attitudes towards computer use and reports significant relationship between years of computer use and level of confidence, and computer attitudes. Inan and Lowther (2010) employ a research-based path model and analyze teacher technology questionnaires to explain factors affecting technology integration and the relationships between the factors. The study aims to explore 1,382 Tennessee public school teachers' perceptions from 54 schools of K-12 about factors affecting technology integration. The authors found teachers' readiness had the strongest effect on technology integration.

2.2.2 Teacher Education on Digital Literacies

At present, many studies (Cervetti, Damico & Pearson, 2006; Dudeney et al., 2013; Erstad et al., 2015; Garcia-Martin & Garcia-Sanchez, 2017; Hafner et al., 2013; Johnson, Adams Becker,

Estrada & Freeman, 2015; Kennistnet, 2011; Leu et al., 2004; Liaw and English, 2013; Tan & McWilliam, 2009; Tondeur, Braak, Sang, Voogt, Fisser, & Ottenbreit-Leftwich, 2012) claim that teacher education on digital literacies is an important agenda in the digital age. Leu et al. (2004) argue that new teacher education and professional development should be prioritized in new literacy education. Their "New Literacy Perspective" (NLP) emphasizes that "the Internet and other ICTs requires new literacies to fully access their potential" and "teachers become more important, though their role changes, within new literacy classrooms" (p. 1589). Selwyn (2012) argues that teachers need institutional support to acquire deep understanding and skills in using social media meaningfully in higher education to foster self-regulated learning and effectively assessing student collaborative work.

It is essential to have appropriate teacher education in order to teach new, multimodal literacies effectively (Tan & McWilliam, 2009). Tondeur et al. (2012) suggest a conceptual model that consists of 12 discerning themes relating to pre-service teacher preparation in incorporating technology. The themes include: 1) theory and practice alignment; 2) teacher educators as a role model; 3) reflective thinking in the role of technology; 4) learning technology by design or material planning; 5) working with peers; 6) supporting when using technology; 7) continuous assessment of learning process. They associate themes 8 to 12 with institutional aspects involving; 8) technology planning and leadership; 9) collaboration within and across institutions; 10) the need of teacher educators' technological training; 11) resource accessibility; and 12) the importance of systematic change efforts. The authors highlight that it is crucial that each theme is interwoven with collaboration.

It is recommended that teacher educators serve as role models to their students in employing digital technological tools in training (Angeli & Valanides, 2009; Cervetti et al., 2006; Kay,

2006; Sukso, 2015; Tondeur et al., 2012). Kay (2006) explains that modeling is to offer pre-service teachers with concrete examples of how they can use technology in their pedagogical practices. Using modeling is advantageous as it "transfers directly to the "real-world" classroom" (Kay, 2006, p. 391). The study of Angeli and Valanides (2009) indicate that pre-service primary teachers discovered observing teacher educators' lectures and technological practices and receiving their feedback were productive to develop their pedagogy. Susko (2015) explores the best practices of 11 education technology programs from the top public U.S. universities. She found teacher educators were able to actively model in using digital tools in their pedagogy, integrating social media to facilitate interaction between pre-service teachers throughout their course. Tondeur et al. (2012) report that the 13 of 19 qualitative studies on strategies to prepare pre-service teachers to incorporate technology into instruction support using teacher educators as role models because it motivates technology integration.

In addition, many research studies on teacher education (Childress, 2014; Haydn & Barton, 2007; Kay, 2006; Price-Dennis & Matthews, 2017; Sukso, 2015; Tondeur et al, 2012) argue for the importance of collaboration among teacher mentors and pre-service teachers for technology use. Price-Dennis and Matthews (2017) argue that teacher education programs should allow students to have a technology mentor to seek advice when they develop lesson designs. Kay (2006) analyzes 68 articles about the use of technology in pre-service teacher education and claims that using mentoring teachers and faculty is important in preparing teachers to use technologies. Pre-service and mentor teachers work together very well by saying "without collaboration involving the mentor teacher, it seems unlikely that gains in attitude and ability will translate to meaningful use of technology" (Kay, 2006, p. 396). The findings indicate that the mentors could give advice to pre-service teachers in pedagogy and this strategic collaboration

is effective in increasing technology use in the classroom.

Sukso (2015) investigates 11 pre-service teacher preparation programs in the U.S higher education regarding educational technology use for teaching and learning. Sukso's (2015) study reveals that 54 participants consisting of deans, teacher educators, librarians, instructional technology staff, and department heads suggest that using consultants to collaborate with teacher educators and in-service teachers is helpful to address the challenges of education technology preparation.

Haydn and Barton (2007) aim to explore the perspectives of 113 science and history trainees and their 21 mentors to find out what strategies promote their progress in using new technology in subject teaching. The findings indicate that sufficient time allowance for technology experiment and "the availability of at least one colleague who could act as a 'role model'; someone who used computers in their teaching, someone who they could talk to about ICT issues" (Haydn & Barton, 2007. p. 10) are very necessary. Thus, the authors argue that observing a technological mentor when he or she uses technology increases pre-service teachers' motivation to apply technology into their own practice.

2.2.3 Teachers' New Role for Students' Digital Literacy Training

There are several arguments why new literacy teachers are expected to train students to acquire digital literacy skills in this digital age. First, "digital literacy practices have become more and more commonplace" (Strickland & O'Brien, 2013, p. 813). Lotherington & Jenson (2011) argue that young learners nowadays should be exposed to the authenticity of social media and able to negotiate with dynamic social interaction, haptic activation, physical coordination, visual design and modal complexity. Eya (2012) suggests using digital resources, such as blogs, wikis as collaborative writing, online tasks, digital portfolio, forums, and online peer assessment

to foster self-regulated learning in the digital platform. In addition, technology can be a "pharmakon" (Kern, 2014), that it has both good and bad sides. Language in the digital world contains nonstandard and fragmented information and a combination of multimodality that may lead to confusion and not foster logical thinking and literacy (Chun et al., 2016). Chun et al. (2016) further emphasize that students should be trained to realize the perils and openness of collaborative community, and different perspectives across social, historical, and cultural norms when they produce writing on wikis or social media sites to public audience.

The American Council on the Teaching of Foreign Languages (ACTFL) call on second language (L2) and foreign language (FL) teachers to integrate digital and multimodal media literacy into foreign language education. (National standards collaborative board, 2015). Teachers need to instill new digital literacies to L2 learners to become "simultaneous creator and consumer of mediated communication" (Lotherington & Jenson, 2011, p. 229).

A plethora of studies (Castek et al., 2007; Chun et al., 2016; Dudeney et al., 2013; Hafner, 2013; Hafner, Chik & Jones, 2013; Kukulska-Hulme, 2009; Lotherington & Jenson; 2011; Prensky, 2010; Strickland and O'Brien, 2013) have suggested that teachers should reframe their pedagogical practices in order to develop student digital literacies. Chun et al. (2016) and Hafner et al. (2013) highlight that students in the digital age need to understand, interpret, and make meanings in online digitally mediated context across technological media, such as chats, social networks, emails and blogs. According to Leu et al. (2004), as new literacies are multifaceted, multiple strategies to interpret and analyze them are needed. So, teachers are expected to train students multiple skills of Internet technologies, linguistic competence, semiotic understanding, audience engagement, identity construction and development to produce digital composition (Hafner, 2013). Kern (2008) especially stresses that new literacy pedagogy requires semiotic

comprehension skills of sound, images, visual, and critical thinking.

In response to the call for digital literacy training, teachers require several new digital literacy skills and pedagogical knowledge to guide students for learning in the digital age. First, Prensky (2010) advises that teachers should excel in asking good questions and guiding students about technological learning tools. Second, Chun et al. (2016), Leu et al (2004) and Strickland and O'Brien (2013) suggest that teachers should supervise students to be thoughtful and critical when sharing every artifact both personally and professionally in open Internet society. Leu et al (2004) believe that critical literacies are central to new literacies. Critical thinking skills are essential to understand and interpret new literacies when one accesses the online information as everyone can freely produce it in public (Leu, Coiro, Castek, Hartman, Henry and Reinking, 2008). Chun et al. (2016) also suggest that teachers should warn students to carefully use words and images to parallel with different technological media because they may be distinctively interpreted.

More importantly, several scholars (Blake, 2016; Chun et al., 2016; Eyal, 2012; Liaw & English, 2013; White, 2015) propose that prior to train student digital literacies, teachers should understand the affordance of each type of technologies in order to select suitable technological tools for learning and teaching activities. Liaw and English (2013) call on teachers to select the most applicable digital tools and resources for students in online environments. Cervetti et al. (2006) suggest that teachers should learn to use technology authentically by creating websites, blogs and discussion groups. Prensky (2010) adds that teachers might gain technology knowledge from students.

There are many learning approaches for teachers to select technological tools appropriately for instruction. Eyal (2012) argues that teachers need digital assessment literacy to understand

the usage of technological tools to select them appropriately for digital assessment. Digital assessment literacy includes skills in developing testing, constructing assessment rubrics, and statistically analyzing cumulative data for teaching and learning. Blake (2016) recommends teachers to participate in various technological training to obtain skills and competence in using digital tools. Chun et al. (2016) restate that teachers should develop a greater understanding of digital games, simulations, automatic writing evaluation (AWE) tools and corpora. As selecting right digital skills for students to learn in the globalized community is complex, Chun et al. (2016) recommend four guiding questions for teachers in creating engaging, meaningful lesson plans afforded by technological tools. The four questions are: 1) what are learning goals?; 2) what are available instructional resources?; 3) how can the resources be effectively used to match the agreed learning goals?; and 4) which assessment is used to measure students' use of resources to attain the goals?

In addition, several scholars have suggested various teaching guidelines for digital literacy instruction. Kessler (2013b) introduces a set of five teaching guidelines in concert with a collaborative online writing project as follows:

1. Allowing sufficient time for students to complete the task.
2. Permitting students to define a project and have an appropriate role in an activity.
3. Encouraging students to ask questions.
4. Offering authentic practice and training in using of digital spaces and tools.
5. Providing feedback and monitoring student progress with scoring rubrics

He further emphasizes that teachers should invest in collaborative communities; for example, creating mentoring and internship programs and communities of practice (COP) and integrate these strategies into classroom practices. In addition, Leu et al. (2004) suggests five approaches

developing online reading skills including: 1) identifying key questions; 2) locating information within a gigantic amount of Internet resources; 3) critically evaluating information; 4) synthesizing information; and 5) communicating information (p. 5).

2.3 Two Theoretical Frameworks in Assessing Digital Literacies: TPACK and DLT

One of the purposes of this study is to evaluate teachers' digital literacies using assessment survey tools designed to follow two theoretical frameworks: the technological pedagogical content knowledge (TPACK) framework (Koehler & Mishra, 2009) and the digitally literate teachers (DLT) framework (White, 2015). Thus, it is essential to explain the conceptual elements, their value and challenges as well as related studies of these theoretical frameworks, in order to justify the use and validity of the frameworks. In brief, the constructs of TPACK and DLT were used as an analytic lens for investigating digital literacy skills and teaching performance of teachers.

In this section, I will divide the theoretical principles and literature on the two frameworks into two sub-sections as follows:

2.3.1 The principles, value, criticism and examples of studies within TPACK framework

2.3.2 The principles of DLT framework

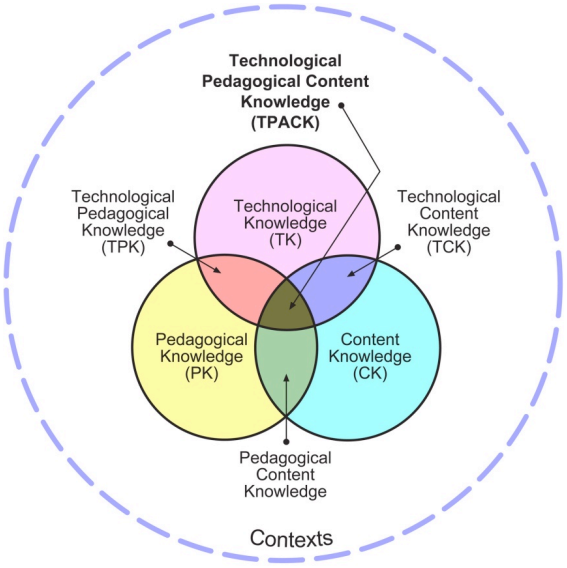
2.3.1 The Principles, Value, Criticism and Examples of Studies within TPACK Framework

The technological, pedagogical, and content knowledge (TPACK) model focuses on teaching with technology. The TPACK model builds on the idea of Shulman's (1987) pedagogical content knowledge or PCK. Shulman (1987) categorizes teacher knowledge into five categories: content knowledge, curriculum knowledge, pedagogical knowledge, knowledge of learners' characteristics and knowledge of educational context. He maintains that PCK is important as it

informs “the distinctive bodies of knowledge for teaching” (p. 8).

Later, Koehler and Mishra (2009) elaborate the PCK framework by integrating technology use, calling it technological pedagogical content knowledge *(*TPCK) or TPACK (See Koehler, Mishra, Kereluik, Shin, & Graham, 2014). Koehler and Mishra (2009) believe teaching with technology is “a complex, ill-structured task” (p. 62) and “difficult thing to do well” (p. 67). So, they argue that teachers need an approach to tackle a challenge of technology integration into their teaching. Accordingly, they proposed TPACK model as a good principle for educators to “successful technology integration” into their pedagogical practices (p. 62). The TPACK framework represents the intersections between technology, pedagogy and content, forming three bodies of knowledge: PCK (pedagogical content knowledge, TCK (technological content knowledge), TPK (technological pedagogical knowledge), which then result in the central concept of TPACK (technological pedagogical content knowledge) (See figure 2.1).

Figure 2.1 TPACK framework and its knowledge components



Based on Koehler and Mishra (2009), the TPACK framework contains seven components as follows:

1. Technology Knowledge (TK) is the knowledge about applying technological tools and resources and information technologies at work and in daily life that move beyond computer literacy. For example, a teacher might know how to use a browser to access the WWW, or know how to solve one's own technical problems.
    a. Knowing how to solve ones' own technical problems.
    b. Learning technology easily.
    c. Keeping up with new technologies
    d. Playing around with technologies.
    e. Having digital technological skills
    f. Having sufficient opportunities to work with different technologies.
2. Content Knowledge (CK) is the knowledge of subject content that teachers teach including fundamental concepts, theories and the nature of inquiries. The CK is different and specific to each discipline. For example, a teacher might have sufficient knowledge and proficiency of English language.
    a. Having sufficient knowledge about English literacy.
    b. Knowing various strategies in developing ones' own understanding of English literacy.
3. Pedagogical Knowledge (PK) is the knowledge of teaching and learning approaches and processes, classroom management skills, student assessment and lesson plan design. For example, a teacher might use a wide range of teaching strategies and digital tools in an English classroom and understand common students' attitudes and preconceptions in learning English.
    a. Assessing student performances in multiple ways.

   b. Adapting ones' own teaching styles to match students' proficiency level.
   c. Using a wide range of teaching approaches in a classroom.
   d. Getting familiar with common students' understandings and misconceptions.
   e. Knowing how to manage a classroom.

4. Pedagogical Content Knowledge (PCK) is similar to Shuman's original framework (1987) which is the knowledge of pedagogy and specific subject content. It focuses on how teachers conceptualize the subject content and select particular learning materials for teaching. For example, a teacher might know how to select appropriate mobile apps and websites to improve students' English literacy.
   a. Selecting effective teaching approaches to guide students in learning English.
   b. Applying teaching methods to match students' learning styles.
   c. Using teaching approaches to fit into the subject matter.
5. Technological Content Knowledge (TCK) is the knowledge of how the content is affected by technology integration. It suggests that teachers know how to select appropriate technologies to work well with particular content. For example, a teacher might know and understand how to use iPad apps to improve their English literacy knowledge.
   a. Knowing about technologies that can be used for understanding the subject content.
   b. Selecting suitable digital resources to gain knowledge of the subject content.
6. Technological Pedagogical Knowledge (TPK) is the knowledge of how technology can impact teaching and learning processes. It also includes understanding of technology affordances and limitations before implement it into teaching. For example, a teacher

might know how to adapt the use of iPad apps and social media to various teaching activities.

   a. Selecting appropriate technologies that enhance teaching approaches for a lesson.
   b. Selecting appropriate technologies that enhance student learning for a lesson.
   c. Thinking critically when applying technologies into classrooms.
   d. Adapting the use of technologies to various teaching activities.

7. Technological Pedagogical Content Knowledge (TPACK) is the complex interrelated knowledge which integrates all CK, PK and TK in specific contexts. For example, a teacher might know how to integrate digital tools, such as iPad apps, digital stories and Facebook into curricular, and use various teaching strategies to design meaningful learning and teaching activities in order to promote student lifelong learning.

   a. Combining literacy, technologies, and teaching approaches for teaching.
   b. Selecting technologies to enhance ones' own teaching.
   c. Using strategies that combine content, technologies, and teaching approaches in a classroom.
   d. Helping other teachers to integrate the use of content, technologies, and teaching approaches into teaching.

So far, a plethora of research (Angeli & Valanides, 2009; Avidov-Ungar & Eshet-Alkalai, 2014; Dudeney et al., 2013; Graham, Borup, and Smith, 2012; Koehler, Mishra, Kereluik, Shin & Graham, 2014; Koehler, Shin & Mishra, 2012; Koh, Chai, Wong & Hong, 2015; Mahdum, 2015; Pamuk, 2012; Sahin, 2011; Saudelli & Ciampa, 2016; Schmidt, Baran, Thompson, Mishra, Koehler & Shin, 2009) has explored and developed TPACK as a framework for teaching with technologies. According to Koehler, Mishra, Kereluik, Shin, and Graham (2014), "the TPACK

framework has received the most traction in research and in professional development approaches, as evidence by over 600 journal articles about TPACK" (p. 102).

For example, some research (Archambault & Crippen, 2009; Chai, Koh &Tsai, 2010; Lehiste, 2015; Mahdum, 2015; Pamuk, 2012) indicate that teachers' overall TPACK perceptions are dominated by certain knowledge domains of TPACK. Archambault and Crippen (2009) examine 596 K-12 online teachers' TPACK level and found out that teachers are satisfied with their PK, CK and PCK, but less confident with TK. Similarly, Mahdum's (2015) findings reveal that 74 in-service high school English language Indonesian teachers' average scores of TK, TCK and TPK are the lowest compared to other knowledge domains of TPACK. Mahdum (2015) argues that the teachers are not very confident with their technology use and the author calls for ICTs training for teachers. Lehiste (2015) also found there is the largest level of confidence development in pre-service teachers' TK, TPK and TPACK, but their TCK receives the lowest level of confidence both in the pre- and post-course survey.

Pedagogical knowledge or PK is found of utmost importance in the studies of Chai, Koh and Tsai (2010), Pamuk (2012), and Saudelli and Ciampa (2016). Chai et al.'s (2010) findings reveal that TK, PK and CK are all significant predictors of preservice teachers' TPACK especially PK most impacts pre-service teachers' TPACK. This may be because technology incorporation becomes the key part of pedagogical procedures. Pamuk (2012) concludes the similar findings from measuring how pre-service junior teachers use technology guided by TPACK framework that limited PK impedes the success in integrating technology. Saudelli and Ciampa's (2016) findings indicate that teachers' PK and years of teaching experience strongly impact their decisions in integrating mobile technology.

The potential value of the TPACK framework can be summarized in two aspects. First, it is a guiding framework for technology integration and has an impact on teacher education and teacher professional development. Koehler and Mishra (2009) maintain that TPACK is a "professional knowledge construct" (p. 66), which suggests essential elements about how to teach effectively with technologies because technology integration is complex and it should not be treated as an "add-on". In other words, TPACK helps teachers to understand and gain multiple knowledge in presenting content with appropriate technologies and using various technology-enhanced teaching methods and pedagogical theories. Dudeney et al. (2013) believe that TPACK principles are helpful in framing technology integration in both pre- service teacher training and in-service professional development courses. Graham et al. (2012) use TPACK as a framing theory to understand elementary teacher candidates' technology integration decisions. Saudelli and Ciampa (2016) apply TPACK as a guiding theory to investigate teacher self-efficacy in three iPad language arts classes. Lehiste (2015) argues that TPACK framework is useful as a guideline in order to develop educational technology training programs by preparing in-service teachers for technology integration into their teaching.

Second, the TPACK constructs can be used as an assessment tool before and after a training program for evaluating TPACK level of teachers. Schmidt et al. (2009) have developed their TPACK survey and test its validity with the use of Cronbach alpha statistics and factor analysis for each domain for measuring 124 pre-service teachers' technology integration into instruction. They validate that their survey is a reliable assessment instrument for measuring teaching knowledge of TPACK. Graham et al. (2009) created a pre-post questionnaire to measure in-service teachers' confidence of four TPACK constructs: TK, TPK, TCK, and TPACK. The survey findings indicate that 15 participants gain significant confidence development in their TK,

TPK, TPACK, and TCK respectively. Chai, Koh and Tsai (2010) use pre and post course surveys to examine pre-service teachers' perceptions in an ICT course in Singapore, that aims to develop their TPACK. Sahin (2011) also develops a TPACK measurement survey to evaluate pre-service English language teachers. The author employs five phases: 1) item pool, 2) validity and reliability, 3) discriminant validity, 4) test-retest reliability, and 5) translation of the TPACK survey and conclude that the survey is valid and reliable to assess teachers' TPACK.

However, it is necessary to recognize criticism within TPACK principles that are discussed in a few aspects (Angeli & Valanides, 2009; Archambault & Barnett, 2010; Graham, 2011; McGrath, Karabas & Willis, 2011). First, the TPACK framework has underlying complexity and multifaceted aspects (Mishra & Koehler, 2006; Graham, 2011). It is difficult to set concrete borderlines of technology, content and pedagogy. Mishra and Koehler (2009) acknowledge that "in some ways, the separation of teaching into content, pedagogy, and technology is not necessarily straightforward… a change in any one of the factors has to be compensated by changes in the other two" (p. 17). Angeli and Valanides (2009) state that TPACK framework is not clear and it does not consider other factors, for example, teachers' beliefs and values about teaching and learning. Graham (2011) criticizes the unclear definitions of TPACK constructs because the TPACK framework is created on weak foundation or PCK that lacks theoretical clarity. Archambault and Barnett (2010) use a 24 item-survey to measure 596 K-12 online distance teachers from across the United States in each of the areas related to the TPACK framework. Their study result indicates that it is difficult and complicated to separate out each of the TPACK domains for valid measurement.

Second, although content, pedagogy, technology, and teaching/learning contexts work independently and together (Mishra and Koehler, 2009), an issue of lacking connection of

TPACK constructs were reported in some studies. Mishra and Koehler (2009) realize that it is challenging to define and determine the relationship of each construct because the knowledge of technology, content, and pedagogy relies on specific contexts. Angeli and Valanides (2009) state that TPACK lacks specificity and transactional relationship among content, pedagogy, and various technology affordances. Archambault and Crippen (2009) investigate TPACK among K-12 online distance educators and found a small correlation among each of the domains within the TPACK framework. They argue that TPACK model does not represent the causative interaction between and among content, pedagogy, and technology and it does not suggest problem-solving approach about educational technology. Based on Archambault and Barnett (2010), there are weaknesses in TPACK's precision and heuristic value. McGrath et al. (2011) analyze the suitability and feasibility of the TPACK concept as a guide for the design and development of a school district's teacher development program and restate that TPACK cannot be used as a single source of conceptual guidelines.

Accordingly, some scholars have proposed new theoretical frameworks for effective technology integration which are mostly grounded by the TPACK domains. Avidov-Ungar and Eshet-Alkalai (2014) add new aspects: teachers' attitudes toward change, teachers' perception of school and cognitive skills of technology use to the original TPACK to make it more authentic and holistic. Koh, Chai, Wong and Hong (2015) propose a 21CL ICT design thinking framework (21CL-ICT DT) as a conceptual framework for teachers. They suggest that teachers would use TPACK as resources to support design thinking processes in technology integration for the development of 21st century competencies of students. Angeli and Valanides (2009) introduce the principles of ICT–TPCK, which represents synthesized knowledge about five strands: 1) ICT affordances; 2) pedagogy; 3) content; 4) learners' characteristics and attitudes; and 5) context,

such as classrooms and educational value that "makes a teacher competent to design technology-enhanced learning" (p. 158).

Overall, teaching successfully with technology requires continually creating, maintaining, and re-establishing a dynamic equilibrium among all components" in the TPACK framework (Koehler and Mishra, 2009, p. 67).

2.3.2 The Principles of DLT Framework

It might be obvious now that why TPACK is used to inform this dissertation. As stated, the TPACK framework may be one of the most acceptable and practical frameworks "for describing the types of knowledge that teachers should master in integrating technologies effectively in their teaching" (Avidov-Ungar & Eshet-Alkalai, 2014, p.19). However, in this study it seems insufficient and not specific to understand and measure teachers' digital literacy skills, knowledge and competence when they select and apply technology into pedagogy.

Hence, White's (2015) digitally literate teacher framework or shorten DLT helps fill a gap of TPACK domains. The seven strands of DLT framework are more up-to-date, relevant and specific for assessing digital literacies, creativity, confidence and criticality of teachers and their skills of digital technology use in their instruction. According to Martin and Grudziecki (2006), new generation requires multiple "literacies of the digital" that involve computer, IT or ICT literacy, technological literacy, information literacy, media literacy, visual literacy, and communication literacy for living and learning in the digital ecology. White (2015) defines digital literacy skills as "the knowledge, skills, abilities, confidence and competences required to develop our usage of digital technologies" (p. 18). He emphasizes that principles of digital literacy include critical thinking, creativity, responsibility, inclusivity, openness and collaboration.

Jonathan White is an experienced teacher and librarian, who has worked for many educational sectors in developing information and digital literacies in the United Kingdom. With White's expertise in teachers' digital literacy development, he proposes "digitally literate teacher framework*"* that is abbreviated as DLT framework elaborated in his book, "Digital literacy skills for FE (further education) teachers". He asserts that it is crucial for teachers to develop digital literacies, confidence, and become digitally literate. Moreover, teachers are expected to gain knowledge of selecting appropriate digital content in teaching and better understand the concepts of digital rights, responsibilities and digital citizenship to actively participate in the digital communities. More importantly, it is important for teachers to develop students' skills of digital literacies and their digital technology use.

White's DLT framework consists of seven "strands" that include both digital literacy skills, themes and issues (pp. 134-138) as follows:

1. Understanding ones' own position as a digitally literate professional and the relationship between the skills and practice. For example, a teacher might understand that he or she needs to integrate iPads into their English language teaching.
    1.1 Understanding ones' own digital needs, abilities and practices and planning for their own development.
    1.2 Understanding the relationship between digital literacy and their subject area(s).
2. Recognizing learners' digital needs, abilities and practices, and plans learning around the development of relevant digital skills. For example, a teacher might understand what and how students use technologies in order to supervise them appropriately.
    2.1 Understanding the issues around learning in the digital age: digital exclusion and equality of access.

2.2 Understanding learners' digital needs, abilities and knowledge.

2.3 Taking the knowledge of learners to guide teaching, learning and assessment.

3. Selecting appropriate digital tools and seeks to use them creatively, critically, and productively. For example, a teacher might know how to select suitable educational apps on iPads to design an engaging learning activity.

   3.1 Using digital technologies in professional practice creatively and critically.

   3.2 Recognizing best practices, legal, policy, safety and security concerns.

   3.3 Teaching creatively through interactive and engaging activities.

   3.4 Understanding pedagogical theories around digital learning.

4. Developing a critical approach to digital information and media while becoming more information literate. For example, a teacher might develop critical thinking skills when selecting online resources in teaching and designing learning activities.

   4.1 Understanding information literacies.

   4.2 Distinguishing between different types of digital information and media.

   4.3 Searching for, finding, assessing, using and applying digital information.

   4.4 Seeking out digital information to improve teaching.

5. Forming and managing a professional digital identity and using it to engage professionally. For example, a teacher might create a digital profile on Facebook and LINE and actively use it to communicate with students and other faculty members professionally.

   5.1 Forming and managing a professional digital identity.

   5.2 Critically understanding and engaging with digital footprint, digital reputation and digital capital.

5.3 Concentrating to, and engaging in, digital communities in order to establish and maintain a digital identity.

5.4 Understanding the significance of engagement in digital communities to non-virtual world.

6. Understanding and leading on digital safety, security, ethical and legal responsibilities and citizenship. For example, a teacher might know his or her legal and ethical rights and responsibilities in order to actively engage in online social groups and communicate with students and other faculty members professionally.

   6.1 Understanding digital safety and security concerns, and being aware of safeguarding responsibilities and procedures.

   6.2 Understanding own legal, ethical and professional rights and responsibilities when using, creating, and publishing digital content.

   6.3 Understanding the definition of digital citizenship and recognizing the rights and responsibilities we each have in digital environments.

   6.4 Understanding how actions online can have real-world significance.

7. Planning for continuous professional development (CPD) and tracking digital trends. Making use of digital tools for reflection. For example, a teacher might set a goal to develop their pedagogical and technological expertise with the use of digital tools.

   7.1 Reflecting critically on digital experiences for future development.

   7.2 Monitoring future digital trends.

   7.3 Using new digital tools to improve own knowledge and skills.

   7.4 Using appropriate digital tools for reflection.

It seems that nowadays teachers should be committed to not only understand digital media, software and tools, but also develop their confidence to teach students to become "digitally literate" who engage with digital technologies and digital skills for creative expression, career prospects, lifelong learning and self-improvement. Moreover, teachers should become digitally literate as well (White, 2015).

Overall, the use of TPACK and DLT constructs as guiding frameworks and knowledge base fit into this dissertation because this study is aimed at evaluating teachers' digital literacies and technology application into learning and teaching. The TPACK and DLT measurement tools which are used to assess teachers may raise their awareness to see the value in integrating digital technology into curricula and improve their understanding and skills of digital literacies.

2.4 The Potential of Web 2.0 Technologies for Digital Literacy Development

Because it is believed that technology is the main tool for teaching and learning in the digital age, this dissertation focuses on the potential of web 2.0 technologies that teachers can apply in their pedagogy to develop their digital literacy skills. Hence, the definition of web 2.0 technologies and their affordances as well as some studies on blogs, digital storytelling and Facebook are discussed because of their increasing popularity for digital literacy development. In this section, there are two sub-topics as follows:

2.4.1 The definition of web 2.0 technologies and the technology affordances

2.4.2 Incorporating various digital writing tools into instruction

2.4.1 The Definition of Web 2.0 Technologies and the Technology Affordances

Web 2.0 technologies are the "applications and services, such as blogs, video sharing, social networking and podcasting – a more socially connected Web in which people can contribute as much as they can consume" (Anderson, 2007, p. 4). The web 2.0 technologies empower a user to

become an author, not merely a passive reader, and to develop a sense of ownership in producing comments, feedback and reflections. Many people now write in electronic forums such as emails, chat, instant messages and blog posts in "hybrid multimodal environments that combine writing, speech, and visual communication" (Kern, 2008, p. 258).

Nowadays, the potential of web 2.0 technologies and social media facilitates innovations of second and foreign teaching and learning in all four skills – listening, speaking, reading and writing (Blake, 2016; Chun et al., 2016; Hafner, 2013; Kessler, 2013b). Hafner (2013) presents three benefits of technology that leverage L2 writing pedagogy. The technology affordance includes: 1) accessibility to hypertext and multimedia; 2) networking in participatory culture and; 3) ability to become authentic online audiences that allows readers to "write back" (p. 831).

2.4.2 Incorporating Various Digital Writing Tools into Instruction

In the age of widely emerging ICTs and social networking, there are numerous ways to incorporate technological tools to promote L2 learning performance, engagement, autonomy and responsibility. Kessler (2013b) recommends some collaborative learning projects for students, for instance, group digital storytelling, fanfiction, simulation and gaming construction, video projects, authentic knowledge contribution and Internet meme design.

To date, a plethora of research exists on web 2.0 technology affordance: for example, wikis (King, 2015; Lee, 2010; Miyazoe & Anderson, 2010; Oskoz & Elola, 2010), blogging (Ducate & Lomicka, 2008; Foroutan, Noordin & Hamzah, 2013), Facebook (Chen, 2013), Google Docs (Kessler, Bikowski & Boggs, 2012), digital stories (Castaneda, 2013; Hafner & Miller, 2011; Oskoz & Elola, 2014, 2016), and digital games (Prensky, 2003; Reinhardt & Thorne, 2016). Those studies have significantly proven technology affordance. Hughes and Daykin (2002) argue for the benefits of using online activities for critical thinking and active learning. Hafner (2013)

and Kessler (2013b) maintain that it is crucial to incorporate technologies for pedagogical potential to enhance interaction and negotiation of meaning.

The use and studies of web 2.0 technologies discussed in this study are blogging, digital stories and Facebook. Many blog studies guarantee its affordances in enhancing storytelling, collaboration and motivation (Amir, Ismail & Hussin, 2011; Huffaker, 2009; Montero-Fleta & Pérez-Sabater, 2010), fostering critical thinking (Hughes & Daykin, 2002; Kitchakarn, 2013), and promoting autonomy, ownership and creativity (Amir, Ismail & Hussin, 2011; Ducate & Lomicka, 2008; Foroutan et al., 2013; Kitchakarn, 2013). In addition, blogging can raise genre awareness (Reinhardt & Thorne, 2011), develop writing skills (Kitchakarn, 2013; Yunus, Tuan & Salehi, 2013), improve writing fluency and lexical complexity (Fellner & Apple, 2006), and broaden cross-cultural competence and informal situated learning in the study abroad context (Comas-Quinn; Mardomingo & Valentine, 2009; Lee, 2012).

Thorne (2009) asserts that blogging can build new sociocultural practices in the community. The concept of adding information in web blogs constructs knowledge in social context (Nicosia, 2013). In addition, blogs contribute to writing and vocabulary development and develop reflective thinking, confidence and ownership. For example, Kitchakarn (2013) studied how blogs and a peer feedback activity have developed Thai students' English writing, critical thinking and autonomous learning. Blogs increase Malaysian students' collaborative writing processes, interactions with peers and autonomy (Amir, Ismail & Hussin, 2011) and promote ESL writing skills (Yunus, Tuan & Salehi, 2013). Moreover, blogs can increase motivation. Montero-Fleta and Pérez-Sabater (2010) find students feel more engaged in posting responses on blogs when writing collaboratively with other peers in a small group. Miyazoe and Anderson's (2010) study confirms the potential of the use of wikis, blogs and forums in increasing EFL

Japanese university students' motivation and writing skills. Blogs can be also used to raise genre awareness because they offer many social text types that can be analyzed across language and topics (Reinhardt & Thorne, 2011).

However, it is not always productive to use blogs in teaching and learning. If students are passive and lack adequate linguistic competence, they might not want to post comments on their peers' blogs (Yunus et al., 2013). According to Lakarnchua and Wasanasomsithi (2013), the lack of good understanding towards using blogs and the unpopularity of usage in Thailand may cause Thai EFL students to feel negative about blog use.

On the other hand, the benefits of incorporating a digital storytelling project to develop writing process and support autonomy have been affirmed by several ESL scholars (Castaneda, 2013; Hafner & Miller, 2011; Oskoz & Elola, 2014, 2016). Digital stories can develop students' autonomy and motivation (Castaneda, 2013; Hafner & Miller, 2011). Castaneda's (2013) study reveals that high school students are engaged and proud as film directors of their digital story project. Oskoz and Elola (2014) confirm that six EFL students in their Spanish advanced writing class develop their writing in different genre practices, gain "a new set of multimodal communicative conventions" (p. 195), and feel positive in creating digital stories. The students believe that their academic writing becomes more authentic and personal through digital stories. Additionally, Oskoz and Elola (2016) have discovered that students are able to "understand the syntactic, vocabulary and structural changes required to move from a traditional text to the narrative of a multimodal digital story" (p. 337).

It is also believed that Facebook has become an alternative learning technology in L2 teaching and learning as it offers "content creators, read and write page and interactive" design (Chun et al., 2016, p. 72). A number of studies have proven the affordances of Facebook for L2 learning

(Chun et al., 2016; Mills, 2011) in improving writing quantity (Wang & Vasquez, 2014), enhancing class discussions (Roblyer, McDaniel, Webb, Herman & Witty, 2010), writing skills (Suthiwartnarueput & Wasanasomsithi, 2012), and developing identity and peer interaction (Reinhardt & Zander, 2011).

Facebook has been broadly accepted as it helps develop students' learning in several ways. Roblyer et al.'s (2010) study reveals that students feel comfortable with Facebook, and it supports learning communication. Similarly, Wang and Vasquez (2014) report that Chinese learners improve their writing quantity and have a positive attitude about using Facebook because they find that Facebook offers opportunities to retain Chinese characters, expand vocabulary and practice syntactic structures. Reinhardt and Zander (2011) have also discovered that students are positive with the potential of social networking sites (SNSs) for practicing English. In addition, the SNSs increase peer interaction and help learners develop their identities as English users.

Overall, web 2.0 technologies have yielded a number of potential benefits in many aspects, such as creating more comfortable and friendly learning and teaching environments, developing learners' identity and interaction, as well as improving digital literacy skills for both teachers and students.

2.5 Digital Literacies and CALL Studies in Thai Context and "Thailand 4.0" Digital Industry Policy

This dissertation study's goal is to raise awareness of English language in-service teachers in Thailand about developing their digital literacies to teach effectively in the age of digital technology-enhanced language teaching and learning. Thus, it is worth exploring the literature on digital literacy skills and the understanding of Thai teachers and students towards digital

literacies. In addition, the current Thai government policy regarding technology and the digital industry, called “Thailand 4.0”, has greatly impacted higher education policies so that new roles and responsibilities of teachers are demanded in Thailand; therefore, the descriptions of the policy are presented in detail. Thus, in this section, the literature is divided into two sub-topics as follows:

2.5.1 Digital literacies and CALL studies in Thai context

2.5.2 “Thailand 4.0” digital industry policy

2.5.1 Digital Literacies and CALL Studies in Thai context

Recently in Thailand, the call for digital literacy and media literacy development of Thai teachers and students has been increasingly heeded (Jivaketu, 2015; Jongsermtrakoon & Nasongkhla, 2015; Siricharoen & Siricharoen, 2012; Van De Bogart, 2012, 2014). Van De Bogart (2014) believes that “the digital learning environment makes a growing digitally cognitive person” (p. 166) so that it is necessary that Thai teachers should obtain more technological training to develop digital literacies of students. The teachers should be prepared to provide innovative teaching materials, such as adding audio clips for pronunciation practice and suggesting web links to other useful sources. Siricharoen and Siricharoen (2012) explored the perceptions of Thai young children and teenagers, journalists and parents to discover how media impact values, attitudes and behaviors. Their results show that Media and Information Literacy (MIL) skills of Thai students are determined by their critical judgment, personal integrity, family guidance and close friend influence. Siricharoen and Siricharoen stress a crucial need for Thai youth to improve MIL skills.

However, in Thailand, the research on teacher education programs focusing on promote teachers’ digital literacy is scarce. There is only one study to date of Jongsermtrakoon and

Nasongkhla (2015). The authors argue for using an online group investigation on Open Educational Resources (OER) as it could develop pre-service teachers' digital literacies and their awareness of information ethics regarding information privacy, accuracy, property and data accessibility.

Among teachers and students, however, the use of social media is widespread and more integrated in Thai education. Siricharoen and Siricharoen (2012) argue that social media have a good and powerful impact on the learning of the Thai youth generation. Their findings indicate that social media are the most popular media in comparison with print, television and radio for Thai youths. The Net generation use social media to find excitement and to build digital communities. In his study Van De Bogart (2014) integrated the LINE mobile app in English language teaching by creating a LINE group for his class as an alternative communication tool. The results reveal that the students are very responsive to LINE discussions, and they use English more. LINE technology facilitates class discussion and collaboration, creates a motivating, comfortable learning environment and develops the digital literacy of Thai undergraduates. Suthiwartnarueput and Wasanasomsithi (2012) report that Thai EFL low-intermediate students like to use Facebook because it is a useful and engaging online learning tool for discussing English grammar and writing. In contrast, Lakarnchua and Wasanasomsithi (2013) investigated Thai engineering major students' perceptions of the usefulness of blogging for EFL teaching and learning. The results show that the students feel neutral about the usefulness of blogs because of some technical issues of blogging. For example, the blogging website works slowly, and some comments are invisible. In addition, for students, blogging is not popular like other social networks, so there are not many visitors to the blogs. However, the

students found blogging is beneficial most for sharing their work in public and receiving peer and teacher feedback.

The problems of Thai teachers' poor digital technological skills and their reluctance of using technologies still exist and are discussed in several studies. Van De Bogart (2012) finds that Thai primary school teachers lack technological skills in using a tablet computer. The study suggests that the teachers require a certain level of digital technology familiarity to teach students new literacy skills and behavioral patterns on multi-tasking competence. Khamkhien (2012) calls for a greater understanding of using technological tools to facilitate students' learning effectively. Based on Jivaketu's (2015) literature review on teacher development in using technology during the first decade of Thai Education Reform in 1999–2009, Thai teachers are resistant to adopt a student-centered approach and technology integration into their pedagogy. He suggests that teacher education programs in Thailand should emphasize teachers' readiness and willingness in applying new technologies and teaching strategies.

2.5.2 "Thailand 4.0" Digital Industry Policy

The leverage of ICTs toward learning and teaching development is always acknowledged in Thailand. In 2011, the Ministry of Information and Communication Technology (2011) of Thailand published a summary report of Thailand ICT policy framework between 2011-2020, or ICT 2020. The policy mainly highlights "smart learning", which aims to promote Thais' quality lifelong learning. The goal of the ICT 2020 education reform is to develop learners' 21st-century skills, such as "creativity, higher-order thinking, and citizenship" (p. 6) and foster their three core skills: IT literacy, information literacy and media literacy. Teachers and educators are expected to acquire knowledge, understanding and awareness about the impacts of ICT on curricula, especially values and ethics of ICT usage.

More recently, a new influential policy called “Thailand 4.0” has received great attention from Thai educators and scholars, with both praise and criticism, regarding the Thai workforce’s technological readiness (Baker & Jarunthawatchai, 2017; Hongprayoon, 2016; OECD/UNESCO, 2016). In May 2016, according to the Autodesk’s (2016) report, the National Science and Technology Development Agency (NSTDA), the Ministry of Science and Technology, and Autodesk announced a massive campaign in boosting digital manufacturing, digital technology use, and ICT innovations under the “Thailand 4.0 Model”. The “Thailand 4.0” model focuses on innovative and value-based industry with security, prosperity and sustainability. Maesincee (2016) explains that the origin of the name derives from the revolution from the Thailand 1.0 policy, which was an agrarian society; to Thailand 2.0, the age of industrialization, focusing on light industry, import substitution, natural resources and cheap labor; and then to Thailand 3.0, which emphasizes globalization, referring to heavy industry, export promotion, and direct investment. Currently, Thailand is moving toward innovation, technology and creativity, and trade in services. In other words, Thailand has transformative shifts to smart farming, smart enterprise startups, making technologies, high-value services, and highly skilled labor (Maesincee, 2016). Autodesk (2016) reports that the “Thailand 4.0” model aims to adopt 3D technologies, the Internet of Things (IoT), augmented and virtual reality, and robotics into advancing industrial capacities. This industrial revolution will impact the economy’s infrastructure through Small and Medium Enterprises (SMEs) and updated missions of educational institutions.

Hongprayoon (2016) recommends that to achieve the goal of Thailand 4.0, Thai educational institutions should provide work-related knowledge and technological skills for the workforce. More crucially, English language teachers should offer students opportunities to use digital tools

to enhance new literacies. It would seem clear that every student who becomes a digitally literate professional could contribute to the success of the Thailand 4.0 economic policy.

However, Hongprayoon (2016) warns that Thailand may not be ready for this abrupt revolution. The National Statistical Office (2015) cited in Hongprayoon (2016) states that approximately 40% of Thailand's workforce complete only primary education level. Many Thai citizens have a low English proficiency level and limited technological skills. Based on OECD/UNESCO's (2016) review on "Education in Thailand", the Secretary-General of the Organization for Economic Co-operation and Development (OECD) and the United Nations Educational Scientific and Cultural Organization (UNESCO) have accepted that there are many issues and problems of Thai teachers and ICTs in Thai education. For example, inadequate teacher preparation, the lack of holistic strategies for teachers' professional development, teachers' administrative pressures, poor infrastructure of ICTs, and teachers' lack of confidence and skills of ICTs use all remain challenges not yet overcome. According to the 2016-2017 global competitiveness report cited in Hongprayoon (2016), Thailand has been ranked the 63rd among 138 countries relating to technological readiness. Thais' low level English proficiency because of the failure of English language policy in Thailand that has been based on native speakers and Anglo-centric models of English is also found in the study of Baker and Jarunthawatchai (2017). Thus, Thai people are urgently expected to develop their digital technology skills and knowledge to align with the vibrant changes under the Thailand 4.0 policy.

2.6 Mobile Technologies, Mobile Learning and iPad-enhanced Learning and Teaching

One of the research questions of this dissertation study aims at exploring how the in-service teachers and students use digital technological tools, especially tablet computers or iPads, for English language teaching and learning. Therefore, it is important to discuss the research on

mobile technologies and the affordances of mobile learning. Moreover, it will be helpful to review literature on the affordances and limitations of iPad-enhanced language learning and teaching because the context of this study is associated with iPad leverage.

Thus, I will divide the literature on this section into three sub-topics as follows:

2.6.1 Mobile technologies

2.6.2 The definitions, potential and challenges of mobile learning

2.6.3 iPad-enhanced learning and teaching

2.6.1 Mobile Technologies

Mobile devices include smartphones, personal digital assistants (PDAs), tablet computers, and possibly laptops, game consoles and iPods, but exclude desktop computers (Traxler, 2005). The mobile device characteristics are "spontaneous, private, portable, situated, informal, bite-sized, light-weight, context aware, connected, personalized and interactive" (p. 264). At present, mobile technologies are proven as potential tools to foster innovative learning and teaching experiences, and that mobile technologies foster learning most in applied sciences, humanities and formal sciences. Johnson et al. (2015) stated that many practitioners apply the concept of "bring your own device" (BYOD) or "bring your own technology" (BYOT) into their pedagogical practices.

Grajek (2015) believes that mobile technologies will have more rapid growth and popularity by the year 2020. She reports that higher education's top ten strategic technologies for the year 2015 mainly focus on mobile technologies as follows:

1. Creating courses on mobile devices: Blended or hybrid courses which involve online and face-to-face class meeting.
2. Designing full online courses on mobile devices.

3. Integrating mobile devices for instruction.
4. Developing mobile apps for hybrid and fast response: accessibility and data protection.
5. Using mobile apps for corporations: web-based applications on smartphones to derive resources of organizations.
6. Using mobile apps for teaching and learning.
7. Protecting mobile data.
8. Managing mobile devices.
9. Managing near-field communication.
10. Accessing tablet for applications.

Becker, Cummins, Davis, Freeman, Hall and Ananthanarayanan's (2017) NMC Horizon Report: 2017 in Higher Education Edition indicates the power of mobile devices, such as smartphones, smartwatches and tablets, accelerate the emergence of mobile learning. The mobile devices afford great convenience and "potential for new mobile-enhanced delivery models" (p. 40). They offer flexibility for learners to learn anytime, anywhere with prompt access to learning materials. Students become creators because mobile devices and mobile apps enhance their productivity and information sharing (Grajek, 2015).

2.6.2 The Definitions, Potential and Challenges of Mobile Learning

Traxler (2005) gives a definition of mobile learning as "any educational provision where the sole or dominant technologies are handheld or palmtop devices" (p. 261). Park (2011) defines mobile learning as using mobile or wireless devices for learning "while on the move" that enhances "more dynamic and pervasive and also promise more educational potential" (p. 79). Johnson, Adams Becker, Estrada and Freeman's (2015) NMC Horizon Report: 2015 categorizes mobile learning as learning technologies defined as "tools and resources developed expressly for

the education sector" and tools that are beneficial for learning. Learning technologies, which can be both formal and informal, are changing to become "more accessible and personalized" (p. 35).

Mobile learning has received a great attention. There have been many research studies on the potential affordances of mobile devices for educational purposes: for example, mobile phones (Gedik, Hanci-Karademirci, Kursun & Cagiltay, 2012; O'bannon & Thomas, 2014; Şad & Göktaş, 2014; Saran, Cagiltay & Seferoglu, 2008), podcasts (Rostami, Azarnoosh & Abdolmanafi-Rokni, 2017), and tablet computers or iPads (Berque, Bonebright & Whitesell, 2004; Hutchison, Beschorner & Schmidt-Crawford, 2012; Kim, Park, Yoo, & Kim, 2016; Kinash, Brand & Mathew, 2012; Nguyen et al., 2015; Riley, 2013; Saudelli & Ciampa, 2016; Smith, 2008; Wang, Teng & Chen, 2015). Becker et al. (2017) conclude in their findings that one of the top ten issues of educational change includes the notion that online, mobile, and blended learning are essential. They maintain that institutions "simply will not survive" (p. 2) if they do not integrate mobile learning into their strategic plan and upgrade their IT infrastructures.

A study that shows the impact of mobile learning on teacher professional development is Baran (2014), who reviews 37 articles on trends and gaps about the integration of mobile learning into teacher education. She summarizes six themes: 1) an increasing trend in mobile learning integration into teacher education; 2) few reports on theoretical and conceptual principles of mobile learning; 3) a variety of perceptions, attitudes and usage patterns; 4) the positive outcomes of mobile learning mainly reported; 5) limited reports of challenges; and 6) several pedagogical approaches promote mobile learning integration. Baron asserts that "the role of teachers and teacher educators in integrating mobile devices becomes essential in addressing students' learning needs across several disciplines" (p. 29). She recommends more research in adopting community of practices (CoPs) or personalized learning communities (PLCs) into

mobile learning integration within teacher education in some forms of sharing best practices and gaining guidance from a mentor.

A plethora of studies have affirmed the potentials of mobile learning in multifaceted aspects. First, mobile learning can promote good learning outcomes (Chen & Tsai, 2009; Cochrane et al., 2013; Gedik et al., 2012; Hutchison et al., 2012; Hwang & Chang, 2011, 2015; Johnson et al., 2015; Kinash et al., 2012; Lu, 2008; Stockwell, 2007; Wang et al., 2015). Chen and Tsai (2009) argue that an interactive location-based game could support English vocabulary learning efficacy and increase motivation of students in learning English. Lu (2008) finds that Taiwanese vocational high school students can recognize more English vocabulary in the short message service (SMS) than in paper materials, and they feel positive about this vocabulary learning strategy through mobile phones.

Besides, mobile learning can foster mobility and convenience (Elias, 2011; Hwang & Chang, 2011; Kukulska-Hulme, 2009; Melhuish & Falloon, 2010; Riley, 2013; Smith, 2008). Both Elias (2011) and Melhuish and Falloon (2010) state that as mobile phones and iPads are comparably affordable, they allow more portability than laptops with regard to hardware devices.

Mobile learning also increases students' engagement, motivation and positive attitude in learning (Berque et al., 2004; Cochrane et al., 2013; Hwang & Chang, 2011, 2015; Lu, 2008; Martin & Ertzberger, 2013; Militaru, Deselnicu & Pollifroni, 2015; Perez, Gonzalez, Pitcher & Golding, 201; Rostami et al., 2017; Sandberg, Maris & de Geus, 2011; Saran, Cagiltay & Seferoglu, 2008; Theerathean & Srikulwong, 2015; Wang et al., 2015; Wong, Chin, Chee-Lay & Liu, 2010; Xu, Dong & Jiang, 2017). According to Johnson et al. (2015), the BYOD approach fosters students' engagement because using mobile devices in the classroom enhances "hybrid learning", which promotes immediate accessibility of online learning resources that support their

understanding in the lessons. Hwang and Chang (2011) argue that mobile-based formative assessment fosters students' positive attitudes and their academic success. Ozdaml and Uzunboylu (2015) argue that teachers' and students' perceptions are positive about mobile learning. Holden and Sykes (2012) explore the potential affordance of a placed-based, augmented reality mobile game called *Mentira* and found that it is an alternative, motivating tool to learn Spanish on a mobile device.

Moreover, mobile learning supports situated learning (Cochrane et al., 2013; Elias, 2011; Holden & Sykes, 2012; Hwang & Chang, 2011; Melhuish & Falloon, 2010). A classroom has been expanded into an "anytime, anywhere learning environment" (Grajek, 2015, p. 7). According to Kukulska-Hulme (2009), the mobility of mobile technologies creates "new ways of dividing up one's time and crossing boundaries" (p. 160). Mobile phones and other mobile devices enable learners to use their tools for "apprenticeships, physical pursuits, and various investigations out in the field" (p. 160). This performance offers new opportunities of place-based learning; for example, phone-based educational games. Elias (2011) states that mobile technologies support "continuous and situated learning" and facilitate "ongoing learning to occur in multiple locations" (p. 146) because the devices can deliver multimedia content such as pictures, audio files and videos. Consequently, students are not "limited by space and time" (Hwang & Chang, 2011, p. 1023). According to Kukulska-Hulme (2009), learning activities afforded by mobile technologies are more interactive and increase learners' collaboration and decision-making processes while they participate in the field.

Mobile learning has been increasingly designed by the manufacturers in order to support an authentic learning experience (Gedik et al., 2012; Kearney, Burden & Rai, 2015; Stockwell, 2007; Wong et al., 2010). Kearney, Burden and Rai (2015) investigated how 107 teachers use

pedagogical features of mobile learning: collaboration, personalization and authenticity. The results show that teachers can use mobile devices to produce more realistic tasks and imitate real-life tools in suitable subject contents. Wong et al. (2010) claim that mobile-assisted language learning (MALL) enhances students' understanding in learning Chinese idioms and makes language learning become an engaging and authentic learning experience. The students use their mobile phone to take photos and then create content and make meaning in real-life contexts from the photos. Moreover, MALL affords both in-class and online out-of-class discussions that promote the correct usage of idioms.

While there are several affordances of mobile learning, its challenges and issues need to be understood. Becker et al. (2017) raise the issue of discrepancies in the quality of Internet connectivity and in digital engagement of students with varying socio-economic status. Not everyone has equal access to the Internet. Therefore, educators and policymakers need to consider expanding access, affordability and convenience of mobile learning platforms, for instance, upgrading to modern ICT infrastructures. In addition, Becker et al. (2017) discovered that teachers require additional "technical and pedagogical support" (p. 40) in order to integrate mobile learning into their teaching. Ozdamli and Uzunboylu (2015) investigated the perceptions of 1,556 high school students and 467 teachers in Northern Cyprus about mobile learning. The results reveal that the students and teachers are aware of their insufficient knowledge about the blended learning approach with mobile devices although they feel positive about it. O'Bannon and Thomas (2014) explore teacher perceptions of using mobile phones in the classroom and find that more senior teachers tend to feel less active and less supportive about the use of smartphones.

Despite the challenges of mobile learning, it is obvious that mobile devices afford situated learning experience and make lessons more engaging. In the next sub-section, the potential of table computers or iPads on learning and teaching will be described in detail.

2.6.3 iPad-enhanced Learning and Teaching

As was mentioned above, manufacturers of IT are increasing designed their products and features to enhance the digital learning experience. A large number of scholars have acknowledged the potential of iPads for both learners and teachers in two big groups: students and teachers. First, iPads are beneficial for students for many aspects. iPads can increase student motivation (Perez et al., 2011; Theerathean & Srikulwong, 2015), create satisfactory learning outcomes (Cochrane et al., 2013; Kinash et al., 2012; Smith, 2008; Theerathean & Srikulwong, 2015), enhance criticality (Rowsell, Saudelli, Scott & Bishop, 2013), and improve English vocabulary learning for Taiwanese learners (Wang et al., 2015). Theerathean and Srikulwong (2015) find that Thai university students understand the course content better and develop analytical skills when they use iPads for learning.

Second, iPads are useful for teachers. For example, iPads enhance teaching strategies (Riley, 2013), offer authentic teaching materials (Riley, 2013; Van Orden, 2006), and promote faculty engagement in professional development and active learning and teaching (Hargis, Cavanaugh, Kamali & Soto, 2014). Van Orden (2006) developed his German language teaching approaches with various apps on tablets. He states, "using a Tablet PC and a digital projector has helped me enliven my teacher comprehensible input" … and create a Digital Deutschland in my classroom (p. 111).

Some core capacities of iPads are worth discussion in detail here. First, iPads facilitate group interaction, collaborative work, and promote engagement (Cochrane et al., 2013; Hutchison et

al., 2012; Manuguerra & Petocz, 2011; Melhuish & Falloon, 2010; Rossing et al., 2012; Rowsell et al., 2013; Smith, 2008). Smith (2008) reports tablet computers foster students' group work dynamics in computer science, chemistry and Japanese language at DePauw University. Sharing work and lecture notes in a small group becomes more collaborative, dynamic and convenient. According to Smith's (2008) results, in a Japanese course, the students state that practicing writing Japanese characters is more fun and practical with immediate feedback from a class teacher outside the class. Manuguerra and Petocz (2011) investigated iPad usage in teaching activities over 15 months and prove its affordance in promoting student engagement. Rossing et al. (2012) also find that students value the advantage of using iPads in facilitating class discussion because they can search for information quickly and share it with the class.

The portability of iPads offers ubiquitous access to learning (Smith, 2008; Theerathean & Srikulwong, 2015). Students can also access course materials anywhere and participate in a virtual classroom. Theerathean and Srikulwong (2015) report that Thai undergraduates feel positive towards iPad-enhanced learning and teaching and the iTunes U platform because the course materials are more accessible and iPads allow a ubiquitous access to authentic online resources.

Furthermore, iPads afford situated learning and creativity. iPads empower an intuitive, constructive thinking, social connectivity and personalized learning (Melhuish & Falloon, 2010). Hutchison et al.'s (2012) findings reveal that when fourth-grade students use iPad apps such as "iBooks" for downloading books, "Popplet" for mind mapping, and "Doodle Buddy" for drawing and doodling, they show more creativity and solve problems independently without a teacher's guidance. Kim et al. (2016) also claim that tablets can improve young Korean students' creativity and visual thinking in English classes.

Another convenient feature of iPads is that they are effectively always on, unlike PCs and laptops, which have to be booted up. IPads are also easy and convenient to be on and off. (Hutchison et al., 2012; Kinash et al., 2012). Kinash et al.'s (2012) study reveals that 135 college students prefer iPads to Blackboard Mobile Learning because of the usefulness and ease of use of iPad apps.

However, several scholars (Archibald et al., 2014; Culén & Gasparini, 2011; Hargis et al., 2014; Hutchison et al., 2012; Park, 2011; Rossing et al., 2012) report some challenges of iPad application into learning and teaching. First, some technical issues of iPad usage are raised; for example, waste of time in loading webpages, and lack of Flash support (Culén and Gasparini, 2011). Hutchison et al. (2012) find it is difficult to resize texts and images and control the sensitive touchscreen. Archibald et al. (2014) additionally report that the students complain about inconvenience of inputting information into iPads. Thus, teachers should be prepared to solve unexpected technological problems with iPads (Hutchison et al., 2012).

Another issue is a problem of teachers and students' limited skills in using iPads and the need for additional training about iPad usage. Hargis et al. (2014) find that students and teachers at a college in the United Arab Emirates require technological training. "Some faculty members are not technologically inclined" (p. 52). Nguyen et al. (2015) have called upon policymakers and administrative boards to provide technological support and supervision to teaching faculties, staff and students towards mobile learning.

Other problematic issues of iPads include iPads ownership, touch-user features, note-taking and learning pressure (Rossing et al. 2012; Culén & Gasparini, 2011). Culén and Gasparini (2011) conducted in-class observations of two different groups: 40 university students and 26 elementary school children. In both studies, participants were "borrowing" iPads. The

undergraduates felt frustrated about the ownership issues, WiFi connectivity and note-taking on iPads, whereas the children did not have issues about these at all. The kids are patient and enjoy collaboration with their peers. The university students also found that it is difficult to use iPads and face academic and time pressure as they reported that it takes too much time to learn how to use some apps. In contrast, the small children are very positive about exploring the use of iPads and find them easy to use and fun.

Last, the problem of the effect of distraction on participants as a result of the novelty of the devices is raised in the studies of Martin and Ertzberger (2013) and Rossing et al. (2012). Rossing et al. (2012) explored how 209 students from Indiana University – Purdue University Indianapolis (IUPUI) perceived the integration of iPads in the classroom. To visualize and enhance understanding of iPad usage, the student survey results on the several advantages and the limitations of iPads are summarized in the following table.

Table 2.1 iPads' advantages and drawbacks

Themes	Advantages	Limitations
1. Information accessibility	- Authentic resources for problem-solving tasks	- Distracted by Facebook, email checking and games
2. Sharing	- Collaborative learning with a group	- No device ownership
3. New learning	- Excitement about novelty of device - Interactive learning experience	- Unfamiliarity of device - Feel confused and frustrated when using iPads for the first time - Lack training
4. Learning and technology design	-Practical and applicable design for various learning styles, such as visual, auditory and kinesthetic	- Touchscreen keyboard sensitivity - Difficult typing - Time-consuming for note-taking - Slower than paper
5. Convenience and mobility	- Various apps - Easy to use - Portable	- Slow connectivity impedes learning. - Lack of instability of apps - Poor design of apps - Time-wasting when technical problems occur

Overall, based on the table above the benefits of using iPads can be summarized into five characteristics including information accessibility, collaboration, innovative learning, practical design for learning, and mobility. However, several issues of iPad require special attention. For example, the students could be distracted by using iPads for learning. The teachers and students may need sufficient time and practical training to acquire technology skills in order to operate the functions of an iPad and integrate them into learning and teaching productively.

2.7 The UTCC as an Apple Distinguished School with iHybrid Learning System

The University of the Thai Chamber of Commerce (UTCC), which is the author's current workplace and the setting of the present study, has heeded the call of the Thailand 4.0 policy by

integrating technology innovations into curricula across the university. It is important to present detailed descriptions of the UTCC to understand the context of the UTCC as an Apple Distinguished School in detail to visualize the complete picture of an iPad-enhanced teaching and learning environment, university infrastructure facilities, and administrative policies. This knowledge will contribute to provide better insights of how the iHybrid learning system has affected the transformation of the UTCC faculty members' pedagogical practices from traditional pedagogy to iPad-enhanced learning and teaching. This deeper understanding will also offer logical and reliable interpretations of the research findings.

Thus, this section will describe the profile of the UTCC, its missions, and the current university policies and instructional management, which is called "iHybrid learning system" into two sub-topics as follows:

2.7.1 The UTCC profile

2.7.2 iHybrid learning system

2.7.1 The UTCC Profile

Based on the UTCC website, the UTCC is a non-profit Thai private university with a strong connection with the Thai Chamber of Commerce and global entrepreneurs. The university was founded in 1984 and has an undergraduate enrollment of about 6,000 every year. The university's vision is to become one of the leading universities in education for business in Asia by offering subject-based knowledge, iHybrid learning system, work-integrated learning (WIL), and essential business know-how. The university mission is to provide breadth of subject-based knowledge, business know-how, and an ethical mindset to students to become visionary leaders in the business world. The university offers 46 undergraduate programs in eight schools: Accountancy, Business Administration, Economics, Humanities and Applied Arts,

Communication Arts, Law, Science and Technology, and Engineering. In addition, the UTCC International College provides degree programs to students from around the world (UTCC profile, 2018).

2.7.2 iHybrid Learning System

Because the UTCC values digital technology-enhanced pedagogy and mobile learning, the university has implemented an iHybrid learning system. Since 2011, the UTCC has adopted iHybrid, the iPad 1:1, which is a new revolution of the university. Accordingly, until now all new students and teachers have been provided an Apple iPad, and they are able to access three online teaching platforms including E-Learning System, Virtual Learning Environment (Moodle), and iTunes U.

Bunyakiati and Voravittayathorn (2013) describe the infrastructure and implementation of UTCC iHybrid learning. The iHybrid learning with the integration of iPads and iTunes U courses supports five new learning methods. First, it offers students self-paced learning through which students can work at their own speed in studying content in advance of class. Second, it supports face-to-face learning in the classroom because students can access online materials and use them to ask questions, share ideas and present results. Third, it facilitates online collaboration and group discussions through Q&A online forum and video conference. In addition, it provides "actively responding assessment" through the MyChoice Clicker that promotes student engagement and understanding in the subject content. Last, the iHybrid learning system that offers one tablet to each student allows students to access web-based content, e-books and online assessment. This approach can foster students' learning to "analyze socio-economic statistical data" (p. 197).

In 2015, owing to the good recognition of the UTCC's iHybrid framework, the UTCC has become one of a few Apple Distinguished Schools. The Apple Distinguished School designation is "reserved for programs that meet criteria for innovation, leadership, and educational excellence, and demonstrate Apple's vision of exemplary learning environments" (UTCC profile, 2018). Thus, the UTCC is a learning hub in promoting collaboration and sharing resources and practices. In other words, faculty members have opportunities to receive on-site training from Apple distinguished educators and Apple professional development trainers.

Based on the UTCC website, three principles of the iHybrid learning system at the UTCC include:

1) Posting instructional materials online and interactive work for students on iTunes U platform and the SPA (Syllabus, Performance, Assessment) method of course makeover to reach more than 700 online courses. The curriculum design on iTunes U has been adapted to contain case studies, and authentic assessment.
2) Providing an iPad to every student and faculty member to equip them for interactive and autonomous learning.
3) Involving faculty members in continuing professional development programs which consist of 12 phases:
    1. Understanding Thailand 3.0 (4.0 at the present)
    2. Attending iPad workshops for teaching and learning
    3. Learning SPA method
    4. Building professional communities
    5. Using Keynote to discuss the "anatomy of an iPad Lesson"
    6. Inviting outside visitors to give workshops on iPad-enhanced learning and

teaching

7. Counseling faculty members in course planning and using digital tools by staff of the Center for Teaching Excellence
8. Collaborating with 20 technology integrators to develop interactive course materials for iPad-enhanced learning and teaching
9. Developing a workspace for iBook creation, a video studio, and personal help
10. Recruiting staff for a Center for Teaching Excellence to make iHybrid learning system effective and productive
11. Conducting weekly Wednesday meet-ups for faculty members at Apple Regional Training Centre, to share new approaches and solve problems. The goal of the UTCC-Apple Regional Training Center is to provide free workshops of new learning technologies through local schools by experienced educators and experts of the center. The center offers many workshops including OS X for Education, iOS for Education, iWork for OS X, iWork for iOS, iBook Author, iTunes U Course Manager, Challenge-Based Learning, Apple Academy, iPad in Research, Personal Productivity, Digital Story Telling, and Custom Workshop Design
12. Encouraging six of the UTCC faculty members to become Apple professional development trainers. To date, there is only one Apple certified trainer.

It is worth noting that the UTCC is currently working on Items #3 to #11 and planning to integrate iHybrid learning into all departments and all courses.

To respond to the iHybrid learning system, all teachers are encouraged to attend a number of iPad technology training sessions in order to effectively incorporate iPads into instruction. The teachers are expected to skillfully design online learning activities with the use of iPads on the

iTunes U course management platform to align with class objectives and lesson plans. Based on the UTCC goals, students who enroll in Business English courses need to demonstrate their English performance in new digital forms, such as creating Keynote slide presentations, iMovie videos, podcasts with Explain everything, and documents with Pages (UTCC profile, 2018).

The UTCC's iHybrid framework is well-recognized with continually upgraded learning models to accommodate mobile learning that can happen anytime, anywhere via mobile devices (Theerathean & Srikulwong, 2015). Theerathean and Srikulwong's (2015) survey findings from exploring 843 UTCC students' perceptions reveal that most students prefer to use an iPad because it allows them to understand the course content better. The survey also reveals that 76 percent of first-year students use iPads to support group work, and 72 percent use iPads to communicate with others. The authors claim that there is an increase of students' abilities in analyzing, evaluating and co-creating course content with iPad-enhanced learning and teaching. Thus, the iHybrid learning process enables more accessible and convenient learning on a multi-tasking touch-screen iPad. In addition, Bunyakiati and Voravittayathorn (2013) conclude their findings that the UTCC hybrid learning can be a framework for e-learning curriculum design for both students with disability and those with high proficiency. They also argue for the importance of selecting appropriate adaptive technologies for the disabled and using suitable content to develop the high-potential students for their effective e-learning development.

CHAPTER 3: METHODOLOGY

The previous chapter provided ample literature on digital literacies, CALL teacher education, TPACK-DLT theoretical frameworks, mobile technologies, Thailand 4.0 national policy and the iHybrid learning system of the UTCC. This chapter describes five data collection methods which were employed to answer five research questions as follows:

1) What new digital technologies do in-service teachers and students use for academic and non-academic purposes?
2) What are in-service teachers' perceptions of how students use technologies for academic and non-academic purposes?
3) What are in-service teachers and students' perceptions of technology integration into curricula?
4) How do in-service teachers' perceptions of how they and students use technology inside and outside of the classroom impact how they apply technology to their pedagogical practices?
5) How do in-service teachers evaluate the usefulness and viability of various digital technological resources?

The data from five sources: two attitudinal surveys, teacher interviews, student focus group discussions, class observations and teaching artifacts together with my reflective field notes were employed to answer all the research questions.

The main purposes of this study are to assess in-service teachers' digital literacies and raise their awareness of the necessity for digital literacy development and technology integration into curriculum. Moreover, I explore the teachers' and students' digital technology use for in and outside the class and their perceptions of technology integration into their teaching. Importantly,

this study aims to expose hurdles that may hinder teachers from incorporating technology into their teaching even though they are encouraged to follow their university's iHybrid learning system and Thailand 4.0 digital industry policy.

In this section, I will elaborate on the research design and methodology, context, setting, participants, data collection procedures and data analysis divided into four sub-sections as follows:

3.1 Research design

3.2 Context: setting and participants

3.3 Study procedures and data collection

3.4 Data analysis

3.1 Research Design

This is descriptive research using mixed methods in which the data were collected from five sources for triangulation of reliability including:

1) Two attitudinal surveys of 37 teachers and 58 students exploring their digital technology use and their perceptions of technology-enhanced language learning and teaching (TELLT). In addition, I designed a self-assessment survey to assess three focal teachers' digital literacies based on TPACK and DLT principles.

2) Two in-class observations of three English language teachers.

3) Two individual interviews of the three teachers.

4) Three focus group discussions with students from the same classes.

5) Teaching and learning artifacts: selected assignments, three course syllabi, online teaching materials on iTunes U courses and my reflective field notes as supplementary data.

3.2 Context

The data collection started on January 8th 2018 and completed on March 7th 2018. It took nine weeks to collect all of the data. Prior to the research project commencement, I designed surveys for students and teachers since November 2017. Initially, I obtained permission from the University of the Thai Chamber of Commerce (UTCC) to collect the data in November 2017 and an IRB approval from the University of Arizona on the second week of December 2017. After that, the participant recruitment commenced.

In this section, I divide the context of my study into two sub-sections as follows:

3.2.1 Setting

3.2.2 Participants

3.2.1 Setting

This study was conducted at the University of the Thai Chamber of Commerce (UTCC), a non-profit private university in the center part of Bangkok, Thailand. The university, founded in 1984, offers bachelor's, master's and doctoral degree programs and has an undergraduate enrollment of about 6,000 each year. There are 46 undergraduate programs found in eight schools: Accountancy, Business Administration, Economics, Humanities and Applied Arts, Communication Arts, Law, Science and Technology, and Engineering. The International College also offers degrees to students from around the world. The university's vision is to become "one of the leading universities in education for business in Asia" by offering subject-based knowledge, the iHybrid learning system, work-integrated learning (WIL), and essential business knowledge. The university's goal is to prepare students to become professional leaders in the business world.

The UTCC has established an innovative iHybrid learning system, iPad 1:1 since 2011. IPads

have been provided to 17,000 students and 450 faculty members. Until May 2015, over 720 courses were designed and supported by the iTunes U platform. The online instructional materials were posted on iTunes U courses to facilitate the accessibility 24/7 of learning resources. As a result, the university was promoted as an Apple Distinguished School for 2015–2016 for its iHybrid learning program as innovation, leadership and educational excellence. It presented Apple's vision of an, "exemplary learning environment". At the university, teaching and learning are afforded by a well-established and well-integrated information technological infrastructure, including a comprehensive IT department, student and staff support and help desks, modern and technologically equipped classroom facilities, and professional development training from Apple Distinguished Educators. The technological workshops for faculty members include iWork for iOS, iBook Authors, iTunes U Course Manager, iPad in Research and Digital Storytelling.

It is clear that the UTCC, which offers iHybrid learning system and iPad-enhanced instruction, is suitable for my study's objectives.

3.2.2 Participants

I divide the context of participants into two groups: the UTCC teachers and students and three focal teachers.

3.2.2.1 The UTCC Teachers and Students

The participants are all from the UTCC teachers and students. The in-service teachers teach English at the School of Humanities and Applied Arts (HMA). The student participants were from three English courses that their class teacher; Bee, Sam and Ning as pseudonyms was the case study of this study project.

The survey participants consisted of 37 English language in-service teachers both Thai and native speakers of English and 58 Thai college students from various years and programs of study. In the student survey, students were asked to provide their availability for further focus group discussions. Then, five students from each class were recruited to participate in the group discussion. I considered mixed abilities of the students' language use and technology competence so that the sample would appropriately represent the whole class of 30-40 students.

After completing teacher survey collection, I investigated three focal teachers' teaching practices. I first observed three English classes: English for Communication 2 (HG010) taught by Bee (a Thai female), English from Media (HR334) taught by Sam (an American male), and Science and Technology Translation (HR340) taught by Ning (a Thai female). Additionally, I conducted two individual interviews with each teacher. These three instructors were selected based on dissimilar characteristics in terms of age, gender, teaching expertise, teaching styles and technology skills. In addition, I designated three courses based on demographic differences of course objectives, level of content complexity, and technology integration into curricula. (See more details about the participants in Appendix B).

3.2.2.2 Three Focal Teachers and Courses

The detailed description of three teachers and courses follows:

1) English for Communication 2 (HG010) as a core English course aims to enhance four English skills for freshmen. Their English proficiency skills range from high – beginner to pre-intermediate and they were not very experienced with iTunes U courses. The course was taught by Bee (a pseudonym), a young Ph.D. female teacher from Business English Program. She has just joined the UTCC for a year and has the least pedagogical experience in comparison with the other two teachers. She was also a novice using iPads

for instruction. Bee's students were from Japanese language program.

2) English from Media (HR340) aims to study various genres of English through media with a focus on project-based learning. English from Media was an elective course taught by a native speaker of English, Sam (a pseudonym). Sam is a very experienced ESL and EFL teacher who holds Master's degrees in Classical Languages. His students were six juniors from the English for Business Communication program. They are highly motivated and active in learning and they have high intermediate English proficiency. Additionally, Sam appears to understand the concept of digital literacies and feels comfortable with using Facebook in his pedagogical practices. But, he seldom uses an iPad in his teaching. This course was expected to provide intriguing perspectives from students about information literacy and media literacy.

3) Science and Technology Translation course (HR334) is a required English course for juniors and seniors from the English and Translation program. The students have high intermediate levels of English proficiency and they are very comfortable and skillful with iPads. The course instructor is Ning (a pseudonym) who is an experienced senior teacher from the English and Translation program. She holds Master's degree in Translation. She is skillful with iPad-enhanced language teaching and iTunes U course management. Moreover, she is enthusiastic about incorporating technology in her class.

As mentioned earlier, I conducted two interviews with each teacher. A teacher interview was scheduled right after the class observation or within the same week. (See more details about the scheduled class observation and interviews in Appendix C)

3.3 Study Procedures and Data Collection

The main purposes of this study are to evaluate teachers' understanding of digital literacies

and explore how they integrate digital technologies into the curriculum. The data collection took place during the first nine weeks of a 16-week semester starting from January 8 – March 7, 2018. Crucially, prior to data collection, all prospective participants were asked to sign an IRB consent form from the University of Arizona. A pseudonym was assigned to each participant for the use of reference. In addition, the participants' identity was anonymous.

Due to the detailed data collection procedure, I divide this section into five topics as follows:

3.3.1 A pilot study

3.3.2 Attitudinal surveys

3.3.3 Student focus group discussions

3.3.4 Class observations

3.3.5 Teacher interviews

3.3.1 A Pilot Study

Before gathering the data, I conducted a pilot study with a questionnaire survey. I produced an online teacher survey on Google Forms and asked 15 English teachers from other institutions to complete the survey. They have similar characteristics and backgrounds. The responses from the pilot survey presented a satisfactory result to the extent that they could understand and answer my questions. However, many respondents commented that the survey contained too many items and some questions were unclear. Thus, I deleted some confusing items and rewrote the questions to make them more concise. So, the questionnaire was shortened from about 60 items into 30 items.

It should be noted that some open-ended questions in the survey were changed to be conducted in other forms, such as teacher interviews and a self-assessment report. I collected the data from teacher interviews and self-assessment with only the three main case studies. In other

words, Bee, Sam and Ning were asked to complete an additional self-assessment survey regarding TPACK and DLT frameworks and a DLT report to supplement the depth of the data and answer all five research questions.

3.3.2 Attitudinal Surveys

To answer all five research questions, two attitudinal surveys; one for teachers and another one for students were generated. The surveys were developed and adapted from the studies of Ertmer et al. (2012), Hargis et al. (2014), Karabulut et al. (2012), Pang et al. (2015), Reinhardt and Nelson (2004), Schmidt et al. (2009) and Williams et al. (2014). The surveys provided the participants' background and their perspectives about technology use, digital literacy skills and technology-enhanced language teaching and learning. Thus, the survey findings helped frame my inquiry and purposes prior to gathering information from class observations, teacher interviews and focus group discussions. As a result, I was prepared for unexpected situations and emerging data to understand the context better. In addition, the survey results enabled me to identify themes and patterns to answer my research questions.

3.3.2.1 Teacher Survey

All question items in the teacher survey were written in English as all teachers are competent and advanced users of English. The survey took about 20-30 minutes for completion. In relation to the data collection procedure, first, in the beginning of January 2018, I sent an invitation email to 51 English instructors in three English programs in the school of HMA to ask for a consent to participate in the survey. When they agreed to the survey, I emailed the participants an online survey link. However, the online response rate was very low, only 15 in the first week. Thus, I went to the teachers' office and distributed a paper questionnaire with a deadline for submission. As a result, I collected 37 teacher surveys in total.

3.3.2.2 Student Survey

The student survey was used to answer the first research question, "what new digital technologies do in-service teachers and students use for academic and non-academic purposes?" and the third one, "What are in-service teachers and students' perceptions of technology integration into curricula?".

The questionnaire was written in the Thai language to accommodate students' different level of English proficiency. It took 15-20 minutes to complete the survey. During the first class observation, I asked permission from the three course teachers, who agreed to be my case studies, to introduce my study to the students in their class. Then, I informed the students about the survey and asked for their cooperation. After that, I distributed a consent form and the questionnaire to each student and the students were asked to return them at the end of the class or they could contact me to pick up the questionnaire.

Also, during the second time of class observation, there was additional survey dissemination for students who were absent from the first meeting. The questionnaires were distributed to 79 students. The return rate was 58, which was satisfactorily high. The results for the 5-Likert-scale questions of the survey were analyzed to uncover the extent to which the group thinks about the propositions in the survey. Next, I classified the qualitative responses into themes arising from the data.

3.3.3 Student Focus Group Discussions

To gain deeper understanding of students' perspectives, I conducted focus group discussions. Three focus group discussions with 4-6 students per group were administered in weeks 6,7 and 9. Each focus group discussion took 30-45 minutes, based on Seidman (2013)'s suggestion that interviewing younger participants should take less than 90 minutes due to their attention span. I

provided some guiding questions and kept my reflective journal while I was leading the discussion. The meeting place is a coffee shop on the campus. After the discussion, the students received 10 US. dollars for their contribution to this study. The conversations were audio-recorded.

3.3.4 Class Observations

To supplement the survey data and address the fourth research question, "How do in-service teachers' perceptions of how they and student use technology inside and outside of the classroom impact how they apply technology to their pedagogical practices?", I conducted two class observations in three English classes during nine weeks of data collection. My role was as a non-participant observer (Marshall & Rossman, 2015) to explore the teachers' use of iPads and other digital technologies. The class observation took 16 hours in total. (See more in Appendix C) I took some short videos and photos with the participants' permission.

3.3.5 Teacher Interviews

Adopting Marshall and Rossman's (2015) topic approach, six sessions of individual semi-structured interviews with three teachers were organized to further address all of the research questions. So, I was able to gather the data thoroughly. Each teacher was interviewed twice around the first two weeks and the week before the midterm exam. The semi-structured interview approach was appropriate to elicit responses from the teachers in implementing technologies in their instruction. Each teacher gave their interviews at their office.

The interviews were conducted on the same day of class observation for one teacher. But, for the other two teachers, they preferred an interview on the following day due to a class conflict and being tired. Due to busy teaching schedule, each interview took 40-60 minutes, adapted from Seidman's (2013) 90-minute length recommendation. After the interviews, I also discussed my

understanding and field notes with the teachers to gain mutual clarification.
The audio recordings were taken with permission.

Moreover, I collected and analyzed the secondary data of three courses: course syllabi, teaching materials on iTunes U course and the students' finished assignments related to technology – enhanced language learning and teaching.

3.4 Data Analysis

The survey information from a larger sample of participants provided some preliminary responses to all five research questions. The quantitative data from the attitudinal surveys related to multiple-choice and Likert-scale items were entered and analyzed by descriptive statistics; mean score and percentage. The scale from the scores was counted that below 2.00 is very low; 2-2.75 is low; 2.75-3.5 is medium; 3.5-4.25 high; and 4.25-5 is very high.

The open-ended qualitative responses were interpreted with a content analysis approach with a preliminary coding scheme taken from parallel studies. Regarding the qualitative data analysis, I created memos (Maxwell, 2012) after class observations, interviews and focus group discussions to enable me to memorize unnecessary information that may not need to be transcribed and to "facilitate analytical thinking" (p.195). I also obtained an analytic strategy of Marshall and Rossman (2015, p.217), so the audio files of class visits, teacher interviews and students' focus group conversations were systematically categorized into separate types. Specific labels of classes, teachers, students and the number of focus groups and interview sessions were neatly assigned to avoid confusion and to be accessible for further reference. All audio recordings were transcribed verbatim. Apart from an English language interview with an American teacher, the two, Thai teachers' interviews were conducted in the Thai language, so I transcribed them and translated them into English later.

Next, I read through all transcripts and then reread them several times to look for similar topics before conducting an open-coding approach (Marshall & Rossman, 2015). With this strategy, I could find repeated words and patterns across the transcriptions to create different codes for different categories or themes in relation to my research questions. The content analysis approach was employed to analyze the data. After the categorized excerpts were manually coded, I filed them into my laptop in separated folders according to each assigned category (Seidman, 2013, p.128). Moreover, I found Maxwell's (2012) recommendation in creating matrices useful and practical to visualize an interpretation.

Later, in the early stage I generated some potential themes to facilitate the process of data analysis according to "theory-generated codes" (Marshall & Rossman, 2015, p.216). Adapting from Rossing et al. (2012)'s themes on technology affordance and challenges, I preliminarily explored: 1) digital literacies; 2) the various uses of digital technologies for personal use; 3) access and availability of iPads and other resources; 4) teachers' sharing and collaboration; 5) learning and teaching styles with technology; 6) student assessment within technology-enhanced language teaching and learning; 7) technology affordance and challenges for its integration into curriculum; 8) teachers' professional development; and 9) convenience and usability. In addition, I employed a content analysis method to examine course syllabi, teaching materials on iTunes U, student finished assignments and teachers' papers.

In summary, I included five instruments: surveys, observations, interviews, focus group discussions and artifact analysis for triangulation of the data based on Maxwell (1996, 2012). I wish to avoid bias and attain validity of my interpretation in the study. In addition, I followed Seidman's system (2013) by writing my reflections derived from the data collection to find congruence with the literature. More importantly, I am aware and thoughtful about data analysis

and take full responsibility to follow ethical guidelines and preserve authenticity and confidentiality.

CHAPTER 4: RESEARCH FINDINGS AND ANALYSIS

This chapter describes the findings and analysis that derived from five sources: teacher and student surveys, teacher interviews, study focus group discussions, class observations, and a collection of teaching artifacts.

The purposes of this study are to assess teachers' digital literacies postulated by Technological Pedagogical Content Knowledge (TPACK) and Digitally Literate Teacher (DLT) frameworks. The study also aims at exploring digital technology use of students and teachers for academic and non-academic purposes and their perceptions of technology integration into curricula. Moreover, the study presents the teachers' evaluation of the viability of digital web 2.0 technology resources for teachers' digital literacy development.

To achieve the study's objectives, five research questions are employed to guide data interpretation as follows:

1. What new digital technologies do in-service teachers and students use for academic and non-academic purposes?

2. What are in-service teachers' perceptions of how students use technologies for academic and non-academic purposes?

3. What are in-service teachers' and students' perceptions of technology integration into curricula?

4. How do in-service teachers' perceptions of how they and students use technology inside and outside of the classroom impact how they apply technology to their pedagogical practices?

5. How do in-service teachers evaluate the usefulness and viability of various digital technological resources?

The findings of students and teachers will be described in separated sections. The teacher and student findings and analysis will be divided into two sections:

4.1 Student aggregate results

4.2 Teacher aggregate results

Owing to the large amount of data and analyses, the case studies of three teachers – Bee, Sam and Ning – will be demonstrated in-depth in Chapter 5 to gain a better understanding of their digital technology use, digital literacy skills, and technology application into pedagogical practices.

4.1 Student Aggregate Results

The findings of students were collected from a student survey and focus group discussions. The participants were 58 Thai undergraduates from three English courses of Spring 2018 whose class teachers were Bee, Sam and Ning, who represented a case in this study. Thus, the students in these classes were automatically recruited in this study.

I will present the student aggregate results followed by my interpretation in four sub-sections:

4.1.1 Students' background information

4.1.2 Students' digital technology use for academic and non-academic purposes

4.1.3 Students' perceptions of technology integration into curricula

4.1.4 Students' understanding of digital literacy concept

4.1.1 Students' Background Information

Prior to exploring students' findings, it is helpful to present students' demographic data and their educational background to better understand the students' perceptions and my interpretation.

Most student participants are female (65.52%, *n* = 38), and the male students are only 35% (*n* = 20). The students' ages ranged from 19 to 27. Eighty percent of students were 19-21 years old. The students were from three programs: English (approximately 50%, *n* = 29), Japanese (48.28%, *n* = 28), and Logistics (1.72%, *n* = 1).

The 57 students are from the School of Humanities and Applies Arts (HMA), and one female student is from the School of Business Administration (BA). The students' English proficiency skills varied from beginning to high-intermediate level.

Table 4.1.1 Course distribution of students (student survey, item 1)

English courses	Teachers	*n*	%
English for Communication 2 (HG010)	Bee	28	48.28
Science and Technology Translation (HR340)	Ning	23	39.66
English from Media (HR334)	Sam	7	12.07
Total	**3**	**58**	**100**

The student survey results in table 4.1.1 show 48% of students studied English for Communication 2 with Bee, a core general English course that all freshmen are required to pass. Approximately 40% of students took Science and Technology Translation course with Ning. It is a required subject for third- and fourth-year students in the English & Translation program.

Last, only 12% of students were from Sam's class of English from Media, which is a free elective English course open for all students across the university. As Sam is an American, students who are interested in taking this course should communicate in English quite well and have intermediate proficiency level of English. As a result, the class was very small because English proficiency skills of many UTCC students are in the beginning and pre-intermediate level. This assumption is based on my 2-year teaching experience and observation as a lecturer in this university.

Based on my class observation, the first-year students from the Japanese program had beginning to pre-intermediate English proficiency level. The students from the two English programs had high-intermediate English proficiency level.

The student survey results show that about 48% of students (n = 28) were freshmen whose major is Japanese language. They took English Communication 2 with Bee. There were 21 juniors and nine seniors from two English programs. There were both juniors and seniors in Ning's class. All seven students in Sam's class were juniors: six from the English program and one from the Logistics program.

4.1.2 Students' Digital Technology Use for Academic and Non-academic Purposes

In this sub-section, I will present the student findings from the survey and focus group discussions followed by my interpretation to answer the first research question, "what new digital technologies do in-service teachers and students use for academic and non-academic purposes?" The students' findings will be divided into two topics as follows:

4.1.2.1 Students' digital technology use for academic purposes

4.1.2.2 Students' digital technology use for non-academic purposes

4.1.2.1 Students' Digital Technology Use for Academic Purposes: Used mainly YouTube, mobile apps, and iTunes U

In this sub-section, I will describe the student survey findings about their digital technology use for academic purposes in Table 4.1.2 followed by my interpretation.

Table 4.1.2 Students' digital technology use for academic purposes (student survey, item 12)

Rank	Technology use	Mean	Rank	Technology use	Mean
1	YouTube	4.10	9	Instagram	2.88
2	Mobile apps	4.05	10	LINE chat app	2.81
3	iTunes U courses	3.84	11	Twitter	2.78
4	Websites	3.66	12	Wikis	2.62
5	iPads	3.60	13	Blogs	2.48
6	Facebook	3.33	14	Emails	2.43
7	Social Network Sites for Language Learning (SNSLL)	3.04	15	Pinterest	2.38
8	Online games	2.95	16	Skype	1.74
Mean					**3.04**

The student survey results in Table 4.1.2 show that the average group score for students' technology use for academic purposes was 3.04. There was a large discrepancy of preference in using each digital technology. The students always used YouTube (4.10), then mobile apps (4.05), and iTunes U (3.84). On the other hand, the students rarely used email (2.43), Pinterest (2.38), and Skype (1.74) which were ranked at the bottom of the list.

The student survey findings reveal that YouTube was the most favorable for authentic and interesting resources for learning (4.10). The students reported that they accessed YouTube to watch English teaching clips, and videos in two languages. The first-year undergraduates who studied the general English course with Bee said that Bee introduced fun English teaching programs on YouTube called "Wrong Say Do" and "The Voice USA" in the class. Many students also stated that they learned English online through YouTube clips and movies on Netflix to "listen to correct English pronunciation and memorize interesting phrases". One student said she could find many useful YouTube videos that helped her better understand the lessons.

Besides YouTube, the students often used mobile apps (4.05) for learning a language. From my observation of Bee's class, I found all students knew how to use the Kahoot app installed on

either their smartphone or iPad to participate in gamified activities in the class. In addition, the students from Ning's class said they used many kinds of apps, such as iTunes U, Nearpod, Notability, Keynote, Pages, Foxit PDF, iMovie, TOEIC, Urban Dictionary, and Thai Best Dictionary.

The students from Ning's class discovered that the Nearpod app was interesting and very useful for writing and sharing translation work in the class. The students also used many language learning apps, such as Busuu, Duolingo, and Memrise to practice English and Chinese languages outside the class. Some English major students from Sam's class were interested in playing word games, such as Word Search and Word Creator to practice English skills. These findings show that the students were interested in making the potential use of digital technologies for academic purposes.

It is no surprise that the students also frequently used iTunes U courses (3.84) for their study according to its third place. It should be noted that at UTCC, every teacher and student was provided an iPad as a tool for the iHybrid learning and teaching system. Thus, the students were equipped with an iPad and familiar with using iTunes U courses that served as a mandated learning and teaching platform for all courses.

In other words, iTunes U is obligatory for all UTCC teachers to use to produce their online courses to the iTunes U catalogs. The teachers are supposed to write in detail their teaching objectives and learning activities of the course and upload all course materials to iTunes U course. Then, the students will be given an enroll code to log in to the iTunes U private course of each teacher. The student survey findings (Q8) reveal that the average group score of students for accessing iTunes U courses was 3.26. This implies that the students logged in to iTunes U courses about 3-4 times a week.

However, in spite of the fact that the university supports the use of technology for teaching and learning, there was also an issue that teachers did not allow students to use digital devices and technology in the class.

According to anecdotal evidence told by the Translation students, the students assumed that teachers usually took it for granted that students used technology for chatting on apps and playing games while they were teaching. Some teachers prohibited students from using their smartphone and iPad in the class. The teachers said technology would distract the students from the class content.

However, the students argued that they often used technology to search for unknown words, take notes, take screen shots and work on productivity apps such as Pages, Numbers, and Keynote. Moreover, the students said they felt uncomfortable if technology was not allowed to be used in the classrooms in this digital age. They were accustomed to searching for photos and online resources to better their understanding about the content of the subject.

The student survey results also show that 62% of students accessed iTunes U courses to view assignments and submit their work. About 34% of students watched video files, read lecture notes and studied the content for next class. Based on the focus group discussions, the students said it was important to view teachers' presentation slides on iTunes U because they were very useful for study revision and exam preparation.

In summary, students often used YouTube, mobile apps, and iTunes U courses for their study in and out of the class. They often used iTunes U courses to view their assignments, do homework, and submit it.

4.1.2.2 Students' Digital Technology Use for Non-academic Purposes: Enjoyed searching for websites most

In this sub-section, I will describe the student survey findings of students' digital technology use for non-academic purposes in Table 4.1.3 followed by my interpretation.

Table 4.1.3 Students' digital technology use for non-academic purposes (student survey, item 13)

Rank	Technology use	Mean	Rank	Technology use	Mean
1	Websites	4.86	8	Twitter	3.47
2	YouTube	4.70	9	iTunes U courses	2.74
3	Mobile apps	4.47	10	Web blogs	2.60
4	LINE	4.37	11	Wikis	2.52
5	Facebook	4.21	12	Pinterest	2.48
6	Online games	4.02	13	Email	2.16
7	Instagram	3.91	14	Skype	1.63
Mean					**3.44**

The student survey results in Table 4.1.3 reveal that students' average score for digital technology use for non-academic purposes was 3.44, which is higher than the use for academic purposes (Q12 = 3.04). The students most enjoyed searching for news and information on websites (4.86) for pleasure. They also watched YouTube videos (4.70) very often. The students said they liked to watch series and movies, read novels, and listen to international songs. The first-year students from Bee's class reported that they followed Japanese animations and cartoons, and learned Japanese vocabulary through YouTube videos and Twitter.

The third rank of technology used for entertainment was mobile apps (4.47). Based on the discussions with the students, they downloaded many kinds of fun apps, especially games, to play in their free time. The students liked playing virtual games (Q13l = 4.02) for fun. The examples of online games are Total War, Hay Day, QuizClash, Fight Test, Peak, Hide and Seek, Gardenscapes and Dream House Sim. One freshman said he played a multiplayer online battle

arena (MOBA) game and found it was a great fun and useful for him to practice using English for communicating with other players in the game.

In summary, the students used digital technologies for non-academic purposes (Q13 = 3.44) more than for academic purposes (Q12 = 3.04). They liked to use websites most for non-academic purposes. YouTube was very popular for both for learning (Q12p = 4.10) and for entertainment (Q13n = 4.70). The least popular technology was Skype, which is ranked the lowest for both academic (Q12k = 1.74) and non-academic purposes (Q13 = 1.63).

4.1.3 Students' Perceptions of Technology Integration into Curricula: Very positive about technology incorporation

One of the important objectives of this study is to understand the extent to which teachers and students are aware of the affordances and limitations of technologies and to explore their perceptions of digital technology integration into learning and teaching. Therefore, the findings of students' perceptions will answer the third research question, "what are in-service teachers' and students' perceptions of technology integration into curricula?"

In this sub-section, I will present the student survey and focus group discussion results for students' perceptions of technology integration into curricula followed by my interpretation. There will be three aspects as follows:

4.1.3.1 Students' perceptions of technology integration into curricula

4.1.3.2 Students' perceptions of technology advantages and disadvantages

4.1.3.3 Students' perceptions of teachers' digital technology application

4.1.3.1 Students' Perceptions of Technology Integration into Curricula: 100% of students supported technology integration into the class

The student survey results indicate that 100% of students agreed that social media and

technology should be integrated into English language curricula. This finding implies that all 58 students value the importance of social media and digital technology.

They reported that technology made them motivated in learning where teachers could apply it effectively. This indicates that using technology in the class does not always guarantee that it will make the class fun and motivate students in learning if the teachers do not know how to use it creatively. Therefore, it can be inferred that students expected teachers to be skillful in using digital technologies for teaching.

4.1.3.2 Students' Perceptions of Technology Advantages and Disadvantages: Convenient and easy to access online learning resources but not satisfied with the unreliability of technology

Based on the students' high recognition of the necessity of technology integration into classrooms, in the student survey, they gave several reasons for their positive and negative viewpoints towards digital technology.

About 31% of students believed technology was easy to use and convenient to access a rich variety of online information and up-to-date resources. In addition, in the digital age, 29% of students found technology was useful for them to expand their new knowledge and make learning easy and ubiquitous. Some students' open responses regarding benefits of technology are the following:

"Easier for teaching".

"Technology can make us learn anywhere any time".

"to become modernized".

"For convenience, accessibility and it creates an opportunity to understand English better".

"If it is fun, students will enjoy learning and understand the lessons".

"Nowadays, everything in real life can happen in the virtual world or social media. Teachers can upload videos on social media that enable students to review the lessons".

"New generation grew up with technology. Technology can help get access to learning resources and this can make students realize that technology is not just used for fun."

Based on the students' responses, it is good to discover that students know how to use technology to improve their learning. With respect to the student experience of iPad-enhanced language learning, the findings obtained from focus group discussions with 15 students show that they often used an iPad to search for online information, deliver a class presentation, and access learning materials and links on iTunes U courses.

Additionally, the students used some classroom apps, such as Nearpod and Kahoot, to participate in learning activities. For example, in Ning's class, the Translation students collaborated with their friends for a group writing assignment and submitted it on Nearpod. They presented the translation work via Airplay mode on their iPad and discussed it with the classmates. In Bee's class, the Japanese major students played language games on the Kahoot app. The students said they felt very comfortable with using iPads for learning.

However, the Translation students reported their frustration of using digital technologies when there was a disconnection of Wi-Fi accessibility in the campus. Due to the unreliability of Wi-Fi connectivity, the students did not like the university's policy in relation to taking exams on iPads. This may be because of their concern of technological problems.

The students were also worried about losing their finished work before submission because of power outages that occasionally happened at the school. They discovered, however, that taking screen shots of the iTunes U assignments with their iPad could help them to have a concrete evidence to show a teacher that they did the assignment. They were also anxious about running

out of iPad battery while doing a class assignment and afraid of losing their iPad because they must pay its depreciation to the university.

Regarding the disadvantages of using iPads for learning, students said in the group discussion that using iPads could give trouble to students who use a Samsung phone. They must learn new technology skills to operate the iOS system on an iPad that is different from the Android system on their phone. However, they added that they always learned new technological issues from YouTube videos and "How To" websites.

In summary, the students showed a positive attitude towards emerging digital technologies. The students felt excited to learn new technology as they thought technology was essential in this age. In addition, they found social media and digital technologies facilitated their daily living and learning. IPad technology accelerated learning made it more accessible and more convenient than a traditional method. More especially, the students enjoyed taking notes on apps and presenting their work via Airplay mode from their iPad. The students seemed to be prepared to tackle technology unreliability. They also learned to solve technical problems by themselves.

4.1.3.3 Students' Perceptions of Teachers' Digital Technology Application: Not very satisfied with teachers' technology use but appreciative of their effort

Referring to the findings from student focus group discussions, Sam's students stated that they felt empathetic to some senior teachers who were not familiar with using iTunes U. However, they needed to integrate it to the class to comply with the university's iHybrid learning. The students reported that many senior teachers just "uploaded slides" on iTunes U courses and gave no explanations on the use of the slides. Accordingly, the students suggested that the senior teachers should undertake technology training and learn how to use classroom

equipment and digital technologies for teaching more adeptly. The students also wished that their teachers used technology to facilitate teaching and learning.

The students added that they understood the teachers' difficulties of using digital technology because the teachers did not grow up with the modern technology like they did. In addition, they assumed that the teachers might not use technology on a daily basis, so they were not skillful and comfortable in using it. The students complained that sometimes it wasted class time when the teachers were not competent in using technology tools in the class.

However, the students showed their appreciation towards the teachers' effort in integrating technology into their pedagogical practices. The students also found that some younger teachers were more confident and open-minded in using iTunes U courses to engage active learning more skillfully; for example, posting a topic for class discussions, grading, and giving feedback to students.

There was an interesting anecdotal example of Ning, who has expertise in using digital technology, where its use might be overridden. The Translation students from Ning's class reported in the group discussion that they did not want Ning to mainly rely on the use of an iTunes U course for posting assignments. Put it another way, in Ning's class students were supposed to regularly check homework notifications on iTunes U course every day. However, to keep up with Ning's assignment posting, the students found a solution. They set up a LINE chat group for the class to disperse the information of Ning's assignment postings.
The students recommended that it would be better if a course assignment was given and explained during the class time.

A student from Ning's class complained she was anxious about missing any posts about assignments on iTunes U course. So she had to take her iPad even on vacation. It caused her

inconvenience to carry a big iPad to check postings on the iTunes U app which was installed on the iPad.

In summary, the students found that many teachers were not skillful in applying digital technologies into their classrooms. The students thought it was necessary and urgent for teachers to improve their technological skills.

4.1.4 Students' Understanding of Digital Literacy Concept

Based on the survey findings, young students used various digital technologies to improve their learning. They liked self-learning by researching on websites and YouTube videos. As my study aims at raising awareness of teachers towards the necessity of improving their digital literacy to enhance students' active and collaborative learning in the digital era, it is essential to investigate the understanding and knowledge of students towards digital literacy.

In this section, the students' results of the survey are divided into three aspects related to students' digital literacy followed by my interpretation.

4.1.4.1 Students' definitions of "digital literacy"

4.1.4.2 Students' general digital literacy skills

4.1.4.3 Students' perceptions of digital literacy training

4.1.4.1 Students' Definitions of "Digital Literacy": Good understanding of digital literacy concept

The student survey results in Table 4.1.4 below illustrate students' definitions of the term "digital literacy". The results from the question item 14 will be described followed by my interpretation.

Table 4.1.4 Students' definitions of the term "digital literacy" (student survey, item 14)

Dominant themes of the definitions	n	%
a) Understand and able to use many digital technology tools/ apps skillfully/ appropriately/ legally/ quickly/ beneficially/ easily	16	27.58
b) Able to use technology tools and have analytical skills / critical thinking in evaluating the authenticity and reliability of news stories to share accurate information	13	22.41
c) Apply knowledge and skills to different types of work/ access to digital information and solve basic technical problems for their convenience.	5	8.62
d) Have knowledge of scientific and technical terms and usage	3	5.17
Miscellaneous: - able to give advice about technology usage - follow technology trends - use technology to develop our best potentials, - know the benefits and drawbacks of technology - use technology creatively	8	13.79
(No definition provided by respondent)	8	13.79
Total	**58**	**100**

To evaluate students' understanding of digital literacies, White's (2015) definition of digital literacy and seven strands of DLT framework was employed as a holistic criterion. White defined digital literacy skills as the knowledge, abilities and confidence in using digital technologies to locate, organize, evaluate and present digital information. Moreover, digital literacy involves managing digital identity, understanding information literacy, and developing critical thinking and creativity as a digital citizen with social responsibilities.

Based on the students' broad, reflective definitions in Table 4.1.4, 50% of students had a good understanding of the term "digital literacy". The results in the table above reveal that many students defined digital literacy as understanding, abilities, confidence, creativity, ethical issues, and critical thinking of technology use.

The students' definitions were close and related to White's 7 strands of digital literacy to some extent. The students' good understanding of digital literacy may be because they used digital technology every day and took a course about information literacy, according to their responses in the focus group discussion.

4.1.4.2 Students' General Digital Literacy Skills: Good at web-searching skills and using mobile apps

Students' survey results are described in Table 4.1.5 of their self-assessment score for each digital literacy skill followed by my interpretation.

Table 4.1.5 Students' general digital literacy skills (student survey, item 16)

Rank	Type	Mean	Rank	Type	Mean
1	Using search engines	4.72	9	Using Twitter	3.69
2	Using mobile apps	4.67	10	Identifying original sources of online information	3.66
3	Taking photos and recording videos on phones	4.53	11	Creating multimedia presentation	3.62
4	Using Line Chat App	4.33	12	Deciding if online information is accurate	3.62
5	Using Facebook	4.28	13	Typing English texts	3.53
6	Creating / sending/ receiving phone texts	4.09	14	Uploading videos on YouTube	3.5
7	Using Instagram	4.00	15	Creating software	2.07
8	Determine bias of online information	3.79	**Mean**		**3.87**

Based on the results in Table 4.1.5, students' average score of digital literacy skills was 3.87. This result implies that they were confident in their abilities to operate digital tools and understand issues around digital literacy. The students thought they were competent in using search engines (4.72), using mobile apps (4.67), and taking photos and videos on their phones (4.53).

Conversely, students admitted that they found it was not easy to type English texts (3.53) and upload videos on YouTube (3.5). The most difficult task for students was to use computer programing to create software (2.07). This may because creating software requires more complicated and advanced skills that many language students lack.

The student survey findings for items 19 and 20 reveal that the students sometimes created multimedia projects both for school (Q19 = 2.79) and for fun (Q20 = 2.67). It appears that students were not often assigned to create multimedia work that requires digital literacies. However, they spent some free time using technology to produce their own creative work. A freshman from Bee's class reported his preference in editing and beautifying his photos and posting them on his Instagram. His response suggests students quite enjoyed playing with digital tools to design creative products.

It can be assumed that the small number of reported multimodal class assignments might result from the limited digital literacy skills of teachers. Thus, they might not have creative ideas to design technology-enhanced learning activities.

It may be that if teachers are aware of developing students' digital literacies, they would assign more multimedia work. As a result, learning and teaching will be more meaningful and productive. For example, Ning is knowledgeable in creating video clips with the Explain Everything app, so her students had an opportunity to create a video clip for their final class project. It can be surmised that the students' digital literacy skills will be developed through the creation of multimedia projects.

The survey findings for item 15 also reveal that the students' average score of their digital literacy level was 3.51. The results also show that about 64% of students thought that their digital literacy was at a medium level. About 25% were confident in their high digital literacy,

and 5% believed their digital literacy reached a very high level. Only 10% thought that they had low digital literacy skills. These results indicate that students were confident in knowledge and skills of digital literacy. They said they took a required course about Information Technology in the first year of their undergraduate program.

In addition, in the student survey question items 6 and 7, students rated their technology skills regarding desktop and laptop computer usage skills. The survey findings reveal that compared to typical undergraduates, the skill level of the average group score for students was slightly above average as 3.26 (Q6). However, they gave a much higher score of their computer skills at 4.37 (Q7) in comparison to people around the age of 50.

This finding indicates that the younger generation believes their skills of technology use are about the same level as their peers, but higher than older people whose age is around 50 who might be their parents or teachers.

Last, the students concluded in the group discussion that they were confident in their higher technology skills than the teachers because they were more familiar and skillful with using digital tools both for academic and non-academic purposes.

In summary, the students were very confident in their searching skills most, using mobile apps and taking photos or recording videos on the phone. They occasionally created multimedia projects for school and for fun almost at the same frequency. The students' digital literacy level based on their understanding was moderately high at 3.5. This may be because students had broad exposure to social media and online resources, and they often used digital technology tools on daily basis.

4.1.4.3 Students' Perceptions of Digital Literacy Training: Many students wanted to receive digital literacy training

Based on the student survey findings of item 18, 69% of students wanted to receive digital literacy training. It should be noted that although the students had confidence in using digital technology to find and create digital content, most of them still believed in the usefulness of digital literacy instruction. The students gave a reason that each student's skills of digital technology varied. They added that they saw some of their classmates have low technology skills, so they needed guidance and suggestions from teachers.

Referring to the focus group discussion findings with the Translation students, they believed some teachers were knowledgeable about using educational websites and apps; therefore, the teachers' competence of digital literacy was valuable to share with the students.

They said they expected teachers to suggest interesting educational apps and technological tools in enhancing their English proficiency, especially in grammar and vocabulary knowledge. In addition, it was necessary that teachers supervised them to use social media and digital tools more wisely and appropriately. They wanted to develop their critical thinking skills to evaluate the authenticity and reliability of digital sources. Their responses indicate that these students who support digital literacy instruction may be aware that digital literacy skills are beyond functional IT skills and include themes and issues, such as confidence, creativity, critical thinking, and copyrights. As a result, they believe it is necessary to learn digital literacy from experienced professionals like their teachers. However, the students insisted that they did not want to have formal instruction about using digital technology devices.

In contrast, based on the results in the table above, about 31% of students said digital literacy instruction was irrelevant and unnecessary in an English class. They pointed out that it was

easier for them to learn technology by themselves. They further said that many students had known how to use basic functions of digital technologies because they took a course about ICTs. This comment implies that those students who ignore digital literacy instruction may think that digital literacy involves only basic IT functional skills, and they may have high IT competence.

In summary, although the young generation in this digital age has the potential to use digital technology and online resources to facilitate and develop their English skills, most students had high expectations for the teachers to train them about digital literacy knowledge. Therefore, it is important for teachers to develop their own digital literacy skills. Moreover, it cannot be doubted that digital literacy training is beneficial for students in looking for a job and working successfully in the future.

4.1.5 A Summary of the Students' Findings and Interpretations

The student survey and group discussion findings reveal that most students always used websites, mobile apps, and iTunes U courses for academic purposes. For non-academic purposes, surfing websites and watching YouTube videos were the most enjoyable activities in their free time. On the other hand, the students used Skype the least often for both academic and non-academic purposes.

In addition, they felt very positive towards using digital technologies in learning. All of the students (100%) supported technology integration into English curricula. They thought technology accelerated their learning and that it had become more convenient to get access to new knowledge and enormous authentic online resources in the digital age. Moreover, technology made the class more engaging, which improved their learning motivation. However, the students found the unreliability of Internet connection worrying when they worked online on iTunes U courses.

Regarding their digital literacy skills and knowledge, the survey findings reveal that the students could understand and explain some digital literacy issues. They also believed they used digital technology and social media more skillfully than teachers. However, most students were convinced that it was important for teachers to incorporate digital literacy training into the English classroom because students' digital literacy levels varied. Finally, they suggested that teachers who were not comfortable using digital technology should undertake technological training. However, students felt appreciative of senior teachers who struggled with technology but tried to integrate it into the classrooms.

In the next section, the focus will shift from students' digital technology practices and perspectives to teachers' digital literacies, which are the focus of this current study.

4.2 Teacher Aggregate Results

The teacher aggregate results are the most important as the goal of this study is to assess digital literacies of in-service English language teachers and explore their perceptions of technology-enhanced language learning and teaching (TELLT). To achieve these objectives, five guiding questions have been employed:

1. What new digital technologies do in-service teachers and students use for academic and non-academic purposes?

2. What are in-service teachers' perceptions of how students use technologies for academic and non-academic purposes?

3. What are in-service teachers' and students' perceptions of technology integration into curricula?

4. How do in-service teachers' perceptions of how they and student use technology inside and outside of the classroom impact how the teachers apply technology to their pedagogical

practices?

5. How do in-service teachers evaluate the usefulness and viability of various digital technological resources?

The findings from five sources – teacher surveys, teacher interviews, class observation, student focus group discussions, and teaching artifacts – will be used to answer the above research questions.

The selected topics below are logically organized to answer all five research questions thoroughly. The results will make clear the digital literacies of the teachers, their perceptions of integrating technology into teaching, and their evaluation of digital technology resources in order to design practical and constructive technology-enhanced teacher training.

Due to the massive amount of data, the teacher aggregate results will be presented in eight sub-sections followed by my interpretation as follows:

4.2.1 Teachers' background information

4.2.2 Teachers' digital technology use for academic and non-academic purposes

4.2.3 Teachers' perceptions of students' digital technology use

4.2.4 Teachers' perceptions of technology integration into curricula

4.2.5 Teachers' technology application into curricula

4.2.6 Teachers' evaluation of digital web 2.0 technology-enhanced activities in improving digital literacy skills

4.2.7 Teachers' understanding of digital literacy concept

4.2.8 A summary of the teachers' findings and interpretations

4.2.1 Teachers' Background Information

Prior to reporting the teacher survey findings by the order of sub-sections, the teachers' background information is important to recognize in order to better understand their perspectives, teaching philosophy, and pedagogical practices. Moreover, this essential data can support the credence of my interpretation.

In brief, the number of teacher participants in this study was 37. The teacher survey results show that the majority of teacher participants are Thai (84%, $n = 31$) and six teachers are from the United States or Great Britain. Based on my observation, Thai teachers can use English proficiently. The foreigners can understand Thai language and have a pre-intermediate level of speaking and listening skills because many of them have lived and taught English in Thailand for more than five years.

Many teacher participants are female (67.57%, $n = 25$). It seems common that language teachers are mostly female in Thailand based on my observation. However, it is interesting to note that all six foreign teachers are male. About 51% ($n = 19$) were senior teachers whose age is above 50. Only about 19% ($n = 7$) were younger teachers whose age is between 30-39 years.

About 80% ($n = 29$) of teachers completed their studies in English, English teaching, and linguistics. This figure implies that they have expertise in using and teaching English. Based on my observation and collaboration with them, they are very confident and knowledgeable in their subject content and teaching approaches. Only 10% ($n = 4$) of teachers received a degree in other programs apart from English studies, and they all are native speakers of English.

About 92% of teachers had more than ten years of teaching experience. This suggests they are more likely to have established their own teaching philosophy and become familiarized with their teaching styles. They have developed expertise and competence in their subject content and

classroom management strategies. Thus, it might be challenging for experienced senior teachers to adopt a new teaching approach, especially integrating technologies into their pedagogy.

Approximately 43% (n = 16) of the teachers taught 15 to over 19 hours per week, and 8% (n = 3) of teachers spent over 19 hours per week teaching, implying they must be busy and work hard.

Based on my observation as a university lecturer for 12 years, in Thai higher education the average teaching load is around 9-12 hours a week. For UTCC at the time of conducting this study, the minimum teaching load was 9 hours for Thais and 15 hours for foreigners. It should be noted that in the fall 2018 semester onwards, the minimum teaching loads for Thai teachers at the UTCC will be increased to 12 hours a week.

The configuration of three English programs in the faculty of Human and Applied Arts (HMA) is as follows. The English programs include Business English, English for Business Communication, and English and Translation. About 70% (n = 26) of teacher participants were from the Business English program.

The Business English program takes charge of offering four general English courses for all students at the university, so the course management is divided into two big teams. The teaching team for freshmen offers English for Communication 1 and 2 and the teaching team for sophomores teaches English for Communication 3 and 4. The teachers in each team work collaboratively to design the same criteria of teaching objectives, learning activities, and course evaluation. Each team will have two coordinators who are responsible for collecting teaching materials and uploading them on the iTunes U course.

In summary, regarding the teachers' background information, there were 37 teachers participating in this study. Most of them (80%) were experienced Thai female teachers whose

age is 40-59. The majority of teachers taught general English courses or "English for Communication" to first- and second-year students. About 43% of teachers taught around 15 to 19 hours a week.

4.2.2 Teachers' Digital Technology Use for Academic and Non-Academic Purposes

This section presents the findings of teachers' digital technology use for academic and non-academic purposes that will answer the first research question, "what new digital technologies do in-service teachers use for academic and non-academic purposes?" The findings derived from a teacher survey, class observation, anecdotal evidences, teacher interviews, and teaching artifacts.

The teachers' results of their digital technology use will be divided into three sub-sections:

4.2.2.1 Teachers' digital technology use for academic purposes

4.2.2.2 Teachers' digital technology use for non-academic purposes

4.2.2.3 Teachers' engagement and comfort with digital technology use

4.2.2.1 Teachers' Digital Technology Use for Academic Purposes: Often used websites, emails and YouTube

In this sub-section, the teacher survey findings about their digital technology use for academic purposes will be described followed by my interpretation.

Table 4.2.1 Teachers' digital technology use for academic purposes (teacher survey, item 7)

Rank	Technology use	Mean	Rank	Technology use	Mean
1	Websites	4.14	9	Facebook	2.30
2	Emails	3.62	10	Social Network Sites for Language Teaching (SNSLT)	2.22
3	YouTube	3.49	11	Web blogs	1.62
4	iTunes U	3.30	12	Online games	1.27
5	Mobile apps	3.24	13	Pinterest	1.22
6	iPads	3.00	14	Skype	1.14
7	LINE	2.73	15	Twitter	1.11
8	Wikis	2.38	16	Instagram	1.11
Mean					**2.37**

The teacher survey results in Table 4.2.1 show that the average group score for teachers in using digital technology for academic purposes was 2.30. The top three ranked digital tools were websites (4.14), emails (3.62), and YouTube (3.49). It is apparent that the teachers disregarded the use of social media for teaching, such as Instagram (1.11) and Twitter (1.11). However, Facebook was the most popular social network (2.30).

The teachers reported that they used websites as sources of knowledge, additional and supplementary teaching resources. In addition, the teachers often used emails to follow meeting schedules, and make announcements for administrative work. In addition, based on my class observations and teaching experience at UTCC, I assume that the frequent use of YouTube videos results from using them as additional learning resources for iTunes U courses.

It is surprising that although iTunes U course management is required by the UTCC teachers, the teachers' average score of iTunes U was just above average as 3.30. This result indicates that teachers do not often use iTunes U course for instruction. This also suggests that the teachers might think iTunes U is not the right and useful tool for their teaching.

It should be noted that the teachers' average score of using mobile apps for language teaching was 3.24, which places fifth in the ranking. Based on the teacher survey and interview results, some teachers applied a variety of apps into their teaching: for example, online Dictionary, Kahoot, Nearpod, Explain Everything, iMovie, Tiny Card, and Google Translate.

In addition, the teacher survey findings in Table 4.2.1 reveal that teachers occasionally used the LINE communication app (2.73) for academic purposes. Based on my class observation and teacher interviews, LINE was widely used among Thai teachers. I found all three English departments at the school of HMA created a LINE group for the faculty members to converse, collaborate in project work, schedule meetings, and share information about administrative work.

I also learned that many Thai teachers created a LINE group for each class. The LINE group served as a Q&A space for teachers and students to clarify assignments, discuss the lessons, schedule make-up classes and inform about the submission deadlines. The teachers also used LINE to directly chat with individual students to follow up their learning and solve some personal problems. However, based on my observation and contact with many foreign teachers, they normally contacted students through emails.

In the teacher survey items 8 and 9, the teachers were asked to identify the mobile app they used most often for their teaching and to explain how they use it. The top three ranked apps were YouTube (24%), iTunes U (20%), and Dictionary (16%).

Based on my direct experience as a teacher at the UTCC, I assume that the teachers used YouTube videos most because they needed to provide students' authentic supplementary materials as before- and after-class activities on the iTunes U courses.

In addition, the results show that 20% of teachers used the iTunes U course app for mainly storing all teaching resources, such as PowerPoint slides and YouTube video clips for listening practice and vocabulary development for students' self-study. Only a few teachers reported that they used iTunes U courses productively; for instance, sharing class information with students, assigning homework, and designing collaborative learning activities on discussion forums. It should be restated here that applying an iTunes U course into curricula is mandated for all faculty members. Thus, I think the minimal use of iTunes U might be rather alarming for the university.

In addition, based on the teacher survey results for item 8, 16% of teachers always used the Dictionary app. The teachers explained that they usually asked students to use the online Dictionary app on their iPads and smart phones. The Dictionary app is used as a source of

knowledge to check word meanings, and find example sentences and pronunciation of the vocabulary.

About 10% of teachers used LINE and Facebook to communicate with their students and explain the lessons and class assignments. A teacher responded on the survey that she used LINE for "indirect coaching outside class in terms of ways of thinking towards problems that students may face and need a support or guidance".

In summary, the teachers often used websites, emails, and YouTube most for academic purposes. They seldom or never used new social media, such as Instagram and Twitter, for their teaching. Digital technology was primarily integrated as a tool for communicating, facilitating learning and teaching, and searching for learning resources. The most frequent apps that teachers used for teaching were YouTube, iTunes U, and Dictionary app.

4.2.2.2 Teachers' Digital Technology Use for Non-academic Purposes: Mostly used websites and LINE

This sub-section will describe the teacher survey findings for item 10 about the teachers' digital technology use for non-academic purposes in Table 4.2.2 followed by my interpretation.

Table 4.2.2 Teachers' digital technology use for non-academic purposes (teacher survey, item 10)

Rank	Technology type	Mean	Rank	Technology type	Mean
1	Websites	4.62	9	Skype	1.95
2	LINE	4.51	10	Pinterest	1.86
3	YouTube	4.32	11	Instagram	1.84
4	Emails	4.05	12	Web blogs	1.78
5	Facebook	4.05	13	iTunes U	1.68
6	iPads	3.68	14	Twitter	1.46
7	Mobile apps	3.43	15	Online games	1.38
8	Wikis	2.11	**Mean**		**2.85**

The teacher survey results in Table 4.2.2 show that the average group score for teachers in using digital technology for non-academic purposes was 2.85. Googling or "browsing interesting

stuff" online was the highest ranked activity (4.62). The teachers replied that they often surfed websites for fun to read interesting things, then used LINE (4.51) and watched YouTube videos (4.32). On the other hand, playing online games was not their favorite choice and is scored the least for teachers (1.38).

In Thailand, according to the Statistics Portal data on Thailand's social network penetration of the third quarter 2017, LINE (68%) was the third-ranked leading social network following Facebook (75%) and YouTube (72%).

Based on my observation as a LINE user, many friends, family members, and colleagues routinely use LINE for many purposes. For example, they use LINE to contact people, send love and support through emoticons and stickers, share photos, updates news, make business appointments, and even sell products. Thus, LINE seems to be widely used for living and working.

In addition, the survey results in Table 4.2.2 show that Facebook (4.05) was also popular for non-academic purposes, in the opinion of the teachers. Based on the Statistics Portal data, Facebook was the most popular social network (75%) in Thailand in 2017. It may be correct as I now see my uncle and aunts whose age is around 60 also start using Facebook to follow their family and friends and read updated news.

From my observation as a regular Facebook user, many senior teachers in this study who are my Facebook friends often use Facebook. They tend to post photos about their personal life, hobbies, nice-looking dishes, lovely kids, cute pets, and beautiful tourist attractions they have been to around the world.

In contrast, the survey results show that teachers seldom played games according to their very low rated score (1.38). This finding implies that the lowest ranking of games may result from a

belief that teachers are expected not to play games based on my experience as a teacher. In the Thai education system, a teaching position is honorable and respectable by the society. The teachers are expected to look serious, knowledgeable, and professional; thus, playing games may be considered as nonsensical and ludicrous for Thai educators.

Based on the teacher survey findings for item 15, the teachers generally spent about an hour every day for social media. The top three highly-ranked digital communities that teachers participate in were LINE (2.46), online news (2.38), and YouTube (2.30).

These results suggest that the teachers used LINE about 2-3 hours a day. As described earlier, Thai people have become more obsessed with using LINE. Based on my experience as a LINE user since its first launch in 2011, I think LINE is popular because it saves more money than sending original phone texts and it is more fun to communicate with lovely stickers. In addition, I noticed that the teachers like to share updated news on LINE more often. This evidence can support the findings of the high frequency use of LINE among teachers.

YouTube (2.30) also received high attention from teachers, and they watched YouTube videos about two hours per day. It should be noted here that they liked to use YouTube for both academic (Q7 = 3.49) and non-academic purposes (Q10 = 4.32). It is possibly because YouTube provides useful and entertaining resources for teaching and for fun. The teachers reported in the survey that they found YouTube videos provide rich and authentic resources for language use. Furthermore, the teachers said it was good for listening to live music, and watching online movies and popular shows on YouTube.

In contrast to ubiquitous acceptance for LINE and YouTube, the teachers spent the least time on Twitter (0.22). Apparently, Twitter is not popular in Thailand based on my observation. The use of online games (0.51) and Instagram (0.57) were also ranked at the bottom. This is similar

to the teacher survey findings for item 7 that they seldom used Twitter (1.11) and Instagram (1.11) for academic purposes.

In summary, the teachers used websites, LINE, and YouTube most often for non-academic purposes. In contrast, playing online games was ranked the lowest. The teachers spent most of their time using LINE, online news, and YouTube every day. On the other hand, they seldom or never used Twitter and Instagram.

4.2.2.3 Teachers' Engagement and Comfort with Digital Technology Use: Preferred self-learning and experiment with technology

In this sub-section, the teacher survey findings for item 16 about the teachers' engagement and comfort with digital technology will be described in Table 4.2.3 followed by my interpretation. The findings will help provide a better understanding of how teachers think about various issues of digital technology.

Table 4.2.3 Teachers' engagement and comfort with digital technology use (teacher survey, item 16)

Rank	Teachers' engagement and comfort with technology use	Mean
1	I prefer to develop my technology skills by doing.	4.03
2	I am interested in learning more about technology-enhanced language teaching.	3.81
3	I am comfortable with using digital technologies for fun.	3.73
4	I prefer to receive technological training and support.	3.68
5	I am comfortable with using digital technologies for teaching.	3.65
6	I am confident about choosing appropriate digital tools to support teaching.	3.50
7	I am confident about designing innovative teaching materials with digital technologies.	3.05
8	I have had sufficient training with technology usage from the university.	2.92
9	I collaborate with others to design technology-enhanced language teaching activities.	2.38
10	I took college courses devoted to technology-enhanced language teaching.	2.27
Mean		**3.30**

The teacher survey results in Table 4.2.3 show that the average score for teachers' engagement and comfort with technology was in the average level (3.3). The teachers gave the highest preference score on developing technology skills by doing (4.03). The findings also reveal that teachers were highly interested in acquiring knowledge about technology-enhanced language pedagogy (3.81). They felt more comfortable in using technology for fun (3.73) more than for teaching (3.65).

In addition, the teachers wanted to undertake more technological training and support (3.68). This may be because the teachers did not study about technological skills owing to their lowest engagement score for taking technological courses (2.27). In addition, they may be aware of their limited digital literacy skills about using new technologies.

Noticeably, the teachers also rated collaboration for creating teaching activities rather low (2.38). Possibly, the teachers preferred to work independently. I assume that they may not have time for collaborating in a team. In other words, they may need more support from their colleagues.

In summary, the teacher survey findings show that the teachers were interested in developing their technology skills by doing and learning more about using technologies for academic purposes. From my observation, the teachers' awareness and motivation in acquiring more technology knowledge for pedagogy might be because of the university's iHybrid learning system that all teachers are required to incorporate iPads and iTunes U courses into their curricula.

4.2.3 Teachers' Perceptions of Students' Digital Technology Use: The big mismatch between teachers' perceptions and students' digital practice

Referring to the teacher and student survey findings and analysis, there are some similarities

and discrepancies between digital technology use by teachers and students. For example, for academic purposes, both teachers and students share the similar high preference of using websites and YouTube.

For non-academic purposes, however, the students use more various technological tools and resources than the teachers. The students are likely to move from Facebook to newer digital tools, such as Instagram and Twitter. In the meantime, the teachers are mainly engaged with using Facebook and LINE.

As a result, it is significant to explore what the teachers assume about students' digital technology use. The teacher survey findings will be interpreted to answer the second research question, "what are in-service teachers' perceptions of how students use technology for academic and non-academic purposes?" The results will contribute to a better understanding of the teachers' selection of technologies in their pedagogical practices.

In this section, teachers' survey results will be presented in two sub-sections followed by my interpretation:

4.2.3.1 Teachers' perceptions of students' digital technology use for academic purposes

4.2.3.2 Teachers' perceptions of students' digital technology use for non- academic purposes

4.2.3.1 Teachers' Perceptions of Students' Digital Technology Use for Academic Purposes: Most underestimated the students' technology use especially Instagram

In this section, I will present the survey results of the teachers' digital technology use (item 7), teachers' perceptions of students' digital technology use (item 13), and students' digital technology use for academic purposes (item 12) followed by my interpretation.

Table 4.2.4 The distribution of teachers' technology use (A), teachers' perceptions of students' technology use (B) and students' technology use (C) for academic purposes
Key: TS = teachers' technology use (A), TS ASSUSS = teachers' assumptions about students' technology use (B), SS = students' technology use (C)

Digital technology use for academic purposes					
Technology use	**A**	**B**	**C**	**D**	**E**
	TS (item7)	**TS ASSUSS (item13)**	**SS (item12)**	**TS- TS ASSUSS (A-B)**	**TS ASSUSS – SS (B-C)**
1. Emails	3.62	3.59	2.43	0.03	1.16
2. LINE	2.73	2.86	2.81	-0.13	0.05
3. Skype	1.14	1.76	1.74	-0.62	0.02
4. iPads	3.00	3.54	3.60	-0.54	-0.06
5. Facebook	2.30	3.16	3.33	-0.86	-0.17
6. YouTube	3.49	3.84	4.10	-0.35	-0.26
7. iTunes U	3.30	3.49	3.84	-0.19	-0.35
8. Websites	4.14	3.30	3.66	0.84	-0.36
9. Web blogs	1.62	2.08	2.48	-0.46	-0.40
10. SNSs	2.22	2.59	3.04	-0.37	-0.45
11. Wikis	2.38	2.16	2.62	0.22	-0.46
12. Games	1.27	2.46	2.95	-1.19	-0.49
13. Mobile apps	3.24	3.38	4.05	-0.14	-0.67
14. Pinterest	1.22	1.67	2.38	-0.45	-0.71
15. Twitter	1.11	2.03	2.78	-0.92	-0.75
16. Instagram	1.11	1.97	2.88	-0.86	-0.91
Mean	**2.37**	**2.74**	**3.04**	**-0.37**	**-0.30**

The survey results in column D in Table 4.2.4 illustrate that the teachers' perceptions about their technology use for academic purposes being lower than their students' technology use were correct (D = –0.37). As can be seen, the average score of teachers' technology use (A = 2.37) was lower than the students' average score (C = 3.04).

Based on the results in column E, the teachers underestimated the students' technology use for academic purposes (E = –0.30), especially the use of Instagram (E16 = –0.91) and Twitter (E15 = –0.75). This finding implies that the teachers assumed that students did not often use these social media for learning English. However, the teachers greatly overestimated the students' use of emails (E1 = 1.16) for academic purposes.

It should be noted that the teachers assumed that the students most used YouTube (B6 = 3.84), and their perception was correct (C6 = 4.10) in spite of the fact that the teachers underestimated its use by the students. For the least popular tool, the teachers thought the students would select Pinterest (B14 = 1.67), but in fact they used Skype the least (C3 = 1.74).

Regarding the teachers' perceptions about the students' use of emails, the gap of difference was very wide (E1 = 1.16). This implies that students used other communication tools to contact with the teachers and classmates. Based on my experience and observation, students prefer to use LINE as it is easier and quicker to reach the teachers than emails. Therefore, the findings suggest that teachers should be aware that email correspondence was not widely popular for students (C1 = 2.43) as much as for themselves (A1 = 3.62).

More crucially, the survey findings that teachers underrated students' technology use for learning evidently supported the students' claim about the teachers' misconception towards the students' technology use in the class. The students reported that the teachers often misinterpreted their learning behavior of technology use by accusing them of playing games and chatting during class. In fact, they more often used their phone to search for online sources for better understanding of the lessons. Therefore, I believe these results will make teachers be more cautious of their own assumptions about the students' technology use in the classrooms.

In addition, based on the results in Table 4.2.4, the teachers highly underestimated the students' use of Instagram (E16 = –0.91), Twitter (E15 = –0.75), Pinterest (E14 = –0.71), and mobile apps (E13 = –0.67). In other words, the students used these tools for learning more often than the teachers' assumptions. Perhaps the teachers may not be familiar with the modern digital tools, so they assumed that students might not use them for learning either. In fact, based on focus group discussion findings, the students reported that they followed some international

celebrities on Instagram for learning English, reading English news on Twitter, and retweeting them occasionally.

Another prominent finding from the table above is the widespread use of mobile apps among students for academic purposes (C13 = 4.05). The students used mobile apps more often than the teachers (A13 = 3.24) and the teachers' perceptions of their use (B13 = 3.38). Thus, the teachers' underestimation of the mobile apps may account for the fact that many teachers do not often use various mobile apps and have not integrated language apps in their teaching.

Based on the teacher survey results, the teachers' most frequently used app is only "Dictionary". On the contrary, students reported that they employed a number of apps, such as Urban Dictionary, Notability, Foxit PDF, iMovie, TED Talk, Memrise, and Busuu for studying English. Thus, I think teachers should start exploring a variety of mobile apps and their benefits. They should also investigate how the students apply mobile apps into their English learning.

It is also essential to point out that the teachers' underestimation of using iTunes U courses among students in column E7 was high (–0.35). The teachers' underrated score may result from their little attention in utilizing iTunes U courses. According to the students' focus group discussions, many teachers used iTunes U courses only to store digital presentation slides and links to YouTube videos as learning resources for students' self-study out of class. The students complained that many teachers did not plan to use iTunes U effectively, as some PowerPoint slides of the teachers were confusing and unclear. This suggests that teachers should be more cautious and critical when they uploaded the course materials and slides because they were useful and essential for students' lesson reviews and exam preparation based on students' report.

According to the students' online game use, the teachers highly underestimated the students' use of games (E12 = –0.49) for academic purposes. This may be because playing games seems to

contradict the Thai adults' belief of their lack of benefits for learning. Referring to the student focus group discussions, they reported that they practiced English vocabulary use and reading through many games; for instance, Words, MOBA, Fight List, Gardenscapes, Final Fantasy, Resident Evil, and Total War. The students added that when they played online multiplayer games, they had to comprehend game instructions in English, and they used English to communicate with other online gamers.

Moreover, it should be noted here that teachers' suppositions about students using technology to only play games should be discarded. One main reason is that this negative perception demotivates students in learning.

To clarify my point, I want to add an anecdotal evidence of teachers' misunderstanding of students' technology use in the class. A student complained that while she was Googling on her phone to look for more explanation about the contents of the subject, her teacher saw her using the phone and immediately accused her of playing games. The teacher reprimanded her without asking for clarification. Although she explained herself that the teacher had misunderstood her action, she reported that she felt bad about the teacher and disliked her afterwards. She was so upset that she did not actively participate in the class like before.

This evidence is sad but true because based on my 12-year teaching experience and observation, namely many Thai senior teachers tend to act like classroom police. They are very strict with the classroom rules and want to take control of all learning behaviors. They prefer students to attentively listen to their lecture without using technology as they believe it distracts the students' attention. However, based on my observation and the student group discussion results, now younger teachers are more open-minded and understanding. The students reported that the teachers listened to their comments and allowed them to use technology in the class.

Overall, the teachers' underestimation on the students' technology use for academic purposes may be because the majority of teachers taught general English courses to freshmen and sophomores from different schools. Based on my direct teaching experience, most of these students have poor English proficiency skills and low motivation in learning English. A student from the Business Administration school reported in the group discussion that many of her friends did not like to study English because they were not good at it.

Additionally, it should be stated that all student participants' major is languages; 50% of students are from the Japanese program and 50% from the English program. In other words, based on my class observation and group discussion with the language students, they are more active and motivated in learning English than other schools. Thus, this evidence helps understand why the teachers' average group score of their assumption about students' technology use for learning (M = 2.74) is much lower than the students' technology use (M = 3.04).

I think it is useful to add an anecdotal example of a teacher's perception of students' technology use. Referring to a talk with a male teacher who teaches English and Translation, Tor (a pseudonym) reported that his students were not "excited" and "motivated" as expected when he incorporated technology in the class.

Tor felt his students were very familiar with Facebook and online materials on iTunes U courses. So when he applied these technologies into his teaching, they were "common" and "not exciting" for the students. They were not more motivated in the class as expected. He added that the students enjoyed using newer social networks, such as Instagram and Snapchat. It should be noted that Tor's perception about the students' familiarity of technology use is accurate. The students reported that they always used websites, Facebook, and YouTube for their routine practices.

Therefore, this story implies that Tor's attitude that the technology does not effectively increase students' motivation in learning may cause him to feel it is useless to integrate technology into the class. However, I think the disinterest of students results from my assumption that Tor might not apply technologies in an innovative way that can engage students in learning.

This claim is supported by the students' survey results for item 17 that 7% of students found the lessons more interesting because of technology integration into the class. One freshman said, "if it (technology) is fun, I will use it to study". This indicates that the students do not view technology integration into classroom as a new, exciting practice.

In fact, they believed technology was an essential tool to promote active learning and teaching in the age of digital innovations. The student survey results reveal that 100% of students valued social media and digital technology that they are necessary to be incorporated into an English class.

It can be seen clearly that the students' acknowledgement of technology affordance for abundant resources was in contrast to many teachers' purposes of technology use for increasing students' attention to the lessons. Owing to this disparity between the teachers and students about technology integration, it may make some teachers think that technology is not necessary for their teaching practice or that it cannot motivate students' learning.

Therefore, Tor's anecdotal evidence suggests that the teachers' belief that technology integration into teaching can "wow" students or excite them in learning may need to change because it may not happen anymore in this digital age. Nowadays, the students grow up with emerging digital technology innovations. They were aware of the usefulness of social media and digital technologies because of their gigantic learning resources and knowledge for students'

self-regulated learning. Based on the students' self-report, they use social media and explore new digital technologies every day to access ubiquitous and enormous online resources.

As a result, I think teachers should explore new digital technology and consider it as a tool to create engaging learning activities to develop digital literacy skills, broaden students' knowledge, and enhance self-study because social media and digital technologies are so ubiquitous and viable.

In summary, the teachers highly underestimated the students' technology use for academic purposes, especially the use of Instagram and Twitter. In addition, they used technologies less often than their students for teaching and learning.

4.2.3.2 Teachers' Perceptions of Students' Digital Technology Use for Non-academic Purposes: Overestimated the students' technology use, especially Skype

In this section, the teacher and student survey results of the teachers' technology use, teachers' perceptions of students' technology use and students' technology use for non-academic purposes will be presented followed by my interpretation.

Table 4.2.5 The distribution of teachers' technology use (A), teachers' perceptions of students' technology use (B), and students' technology use (C) for non-academic purposes
Key: TS = teachers' technology use (A), TS ASSUSS = teachers' assumptions on students' technology use (B), SS = students' technology use (C).

Digital technology use for non-academic purposes					
Technology type	**A**	**B**	**C**	**D**	**E**
	TS (item10)	**TS ASSUSS (item14)**	**SS (item13)**	**TS - TS ASSUSS (A-B)**	**TS ASSUSS – SS (B-C)**
1. Skype	1.95	4.19	1.63	-2.24	2.56
2. Emails	4.05	3.19	2.16	0.86	1.03
3. Facebook	4.05	4.70	4.21	-0.65	0.49
4. LINE	4.51	4.76	4.37	-0.25	0.39
5. Games	1.38	4.30	4.02	-2.92	0.28
6. iPads	3.68	4.62	4.50	-0.94	0.12
7. Pinterest	1.86	2.58	2.48	-0.72	0.10
8. Instagram	1.84	4.00	3.91	-2.16	0.09
9. YouTube	4.32	4.76	4.70	-0.44	0.06
10. Twitter	1.46	3.31	3.47	-1.85	-0.16
11. Mobile apps	3.43	4.30	4.47	-0.87	-0.17
12. Web blogs	1.78	2.43	2.60	-0.65	-0.17
13. Wikis	2.11	2.22	2.52	-0.11	-0.30
14. Websites	4.62	4.24	4.86	0.38	-0.62
15. iTunes U	1.68	2.03	2.74	-0.35	-0.71
Mean	**2.85**	**3.71**	**3.51**	**-0.86**	**0.20**

The survey results shown in Table 4.2.5 in column D correctly identify the teachers' perceptions that they used technology for non-academic purposes less often than their students (D = -0.86). In other words, the teachers' average score for technology use (A = 2.85) is lower than the students' score (C = 3.51).

Moreover, the results in column E reveal that the teachers overestimated the students' technology use for non-academic purposes (E = 0.20) for nine types, especially Skype (E1 = 2.56), emails (E2 = 1.03), Facebook (E3 = 0.49), LINE (E4 = 0.39), and virtual games (E5 = 0.28).

However, it is interesting to point out that the teachers underrated the students' use of iTunes U courses most (E15 = -0.71), then websites (E14 = -0.62), and Wikis (E13 = -0.30). The teachers assumed that students would use iTunes U courses (B15 = 2.03) the least often. Rather, Skype was the least popular for students (C1 = 1.63), which contradicted the teachers' high overestimation of Skype (B1 = 4.19).

As can be seen, the biggest distinction between teachers' assumption about students' technology use and students' technology use was Skype (E1 = 2.56). This result suggests the teachers' misunderstanding that students often used Facetime and video calls on Skype. Rather, the students reported that they preferred LINE and Facebook for communication and teleconferencing.

Another outstanding discrepancy found in these findings was the teachers' overestimation of the students' use of emails (E2 = 1.03). The interpretation would be the same as Skype, namely that Thai students often used LINE for communication because it is easy and more convenient to compose texts, share photos, and make video calls.

In summary, the teachers generally overestimated the students' technology use for non-academic purposes, especially Skype, emails, Facebook, LINE, and games. However, they greatly underestimated the students' use of iTunes U courses, websites, and games. Therefore, this result may provide insight for the teachers to better understand the students' learning lifestyle and behaviors about digital technology use for fun.

4.2.4 Teachers' Perceptions of Technology Integration into Curricula: The teachers are positive about integrating technology in the classroom

As this study aims at exploring teachers' attitudes towards technology integration into curricula, data on the teacher survey and teacher interviews were analyzed to answer the third

research question, “what are in-service teachers’ and students’ perceptions of technology integration into curricula?”

This section will present the teacher results in four sub-sections followed by my interpretation.

4.2.4.1 Benefits and drawbacks of technology-enhanced language teaching

4.2.4.2 Factors contributing to technology integration into curricula

4.2.4.3 The biggest obstacles of technology integration into curricula

4.2.4.4 Teachers’ satisfaction with the university’s policies

4.2.4.1 Benefits and Drawbacks of Technology-enhanced Language Teaching: Technology increased students’ motivation and their learning outcome, but it could be unreliable and lead to students’ distraction

The teacher survey findings for item 29 reveal that about 21% of teachers believed that the technology was beneficial to promote students’ motivation and made the class more interesting. A teacher said rapid advancement of technology made today’s learning interesting and attractive.

Another 21% of teachers thought that students could improve their learning outcomes through the leverage of technology. Of the teachers 18% also acknowledged the technology affordance that technology facilitated students to access rich online resources anytime, anywhere. In addition, a few teachers stated that they integrated technologies into their teaching because they were cheap, saving paper and thus saving money.

The teachers’ examples of remarks about the benefits of digital technology are presented below.

“Technology-enhanced language teaching can provide richer learning environments and innovative practice, flexible learning, and scaffolding support for students”.

“The benefits include the students’ interest and higher level of digital literacies”.

“Technological tools are particularly useful for sharing ideas, debating and self-study”.

Regarding the drawbacks of technology, the teacher survey findings show that the teachers were most concerned that technology made students distracted. They reported that the students depended too much on technology and that it disrupted the class management. A teacher stated, “the drawbacks are that they [students] depend too much on technology and have less balance in life to interact with others, but their digital screen in front of them”.

Another teacher raised an issue that “It often occurs that students misuse their phones or iPad for fun or personal purposes – not for learning. This causes the teacher difficulties in managing the class”.

Moreover, teachers were worried about the unreliability of technologies, for instance, technical problems and loss of WiFi connection in the class. The teachers were also anxious about managing their teaching preparation time because they believed designing TELT activities was time-consuming. A teacher reported, “It's complicated to use technology while teaching. It makes my life more difficult”.

The findings additionally show that one factor which discouraged teachers from using technology was because they could not catch up with emerging technology trends. This may be because they are aware of their inadequate skills of technology use.

It is interesting to mention that a few teachers said technology facilitated cheating. They said, “Technology can promote cheating in class and on assignments”.

“Technology can reduce students’ good handwriting and slow down students’ thinking process”.

The following teacher responses were obtained from the survey item 29 in which the teachers addressed the other drawbacks of technology, including student stress:

"… However, pushing students who are not highly-motivated into using technology or familiar with complex applications may cause them stress".

"No surprise for this era. Students are familiar with technology which teachers use in the class".

"Drawbacks are students' digital literacy".

These teachers' comments are valuable for further investigation to find good solutions for effective technology integration.

In summary, many teachers valued technology-enhanced language teaching that could increase students' motivation, improve their learning proficiency as well as make the class fun and interesting. However, the teachers were highly concerned with students' distraction caused by technology, the unreliability of technology and time-consuming class preparation if they needed to integrate technology into their teaching.

4.2.4.2 Factors Contributing to Technology Integration into Curricula: Receive more training and workshops

In this sub-section, the teacher survey findings for item 30 about teachers' persuasive factors that contribute to technology incorporation into their teaching will be described followed by my interpretation.

Table 4.2.6 Factors contributing to technology integration into curricula (teacher survey, item 30)

Rank	Factors contributing to technology integration into curricula	n	%
1	Attend training and workshops	18	48.64
2	Self-study and practice using it on the job	5	13.52
3	Support from colleagues and administration	4	10.81
4	Others (e.g., teachers' digital literacies, shorter classes / reliable students, proper instructions)	4	10.81
5	Nothing (e.g., not interested in technology, not necessary, confident in his/her competence)	3	8.11
6	No responses	3	8.11
Total		**37**	**100**

Referring to question item 30 in the survey, the teachers were asked to write the main factor that helped them become more confident and comfortable with technology integration into English teaching. It can be seen from the teacher survey findings in Table 4.2.6 that about 48% of the teachers were interested in receiving more formal technological training.

One teacher said, "More training. More investment in educational apps." Another stated it is good to have "the compulsory integration of technologies in the curricula and the classroom as well as the full support of the administration".

According to the teachers' open responses, one teacher argued for practical useful training for both teachers and students. The teacher also recommended that in a workshop a technology trainer should teach slowly about how to use technology. The teacher wrote on the survey that a trainer should not "try to impress the audience with [his/her] skills and speed at which [he/she] use[s] them [technologies]". In addition, another teacher commented that she was unable to follow the instructions about using mobile apps in the technology training and she had to learn it by herself.

This finding implies that there might be some difficulties when teachers try to learn a new technology in the workshops. One of the main problems was related to the training style of

technology teacher trainers that may make teachers uncomfortable about the training. Thus, the teachers may not gain sufficient skills they expected when they participated in technology workshops. Thus, this information is useful for teacher trainers in order to improve their training quality.

Some of the teachers' responses regarding the factors that motivate them to integrate technology into teaching are provided below:

"Try using it more. Be open and welcome new technology to your teaching".

"It should be easy as the way we use Facebook".

These comments seem to imply that teachers understood the necessity about developing technology use and skills.

It should be noted here that there was a teacher who strongly disapproved of technology integration for teaching, saying, "Nothing can help because my attitude towards it is rather negative". This remark surprised me as I saw he used Facebook to post his overseas trips and work updates.

His response may suggest that he did not believe the potential of technology for language learning. This teacher claimed that his high achievement in studying English and Mandarin resulted from traditional rote learning method which did not rely on the affordance of digital technology and the Internet.

In summary, many teachers were willing to learn more about technology use by receiving more training and practice. It appears that some teachers were aware of their lack of digital technology skills and their negative attitude towards technology integration into curricula.

4.2.4.3 The Biggest Obstacles of Technology Integration into Curricula: Teachers' limited technological skills and teaching overloads

In this sub-section, the teacher survey findings for item 18 will be described followed by my interpretation.

Table 4.2.7 The biggest obstacles of integrating technology into curricula (teacher survey, item 18)

Obstacles	Descriptions	n	%
Teachers' technological skills	Inadequate knowledge and skills of technologies Too many advancing technologies	7	18.91
Time management	Many teaching loads and responsibilities Lack of preparation time	7	18.91
Students	Low proficiency of English Low motivation Students are distracted by games, Facebook and LINE.	6	16.21
Curricula	Assessment aligned with technology use Teaching the course content is priority.	6	16.21
Infrastructure and Internet system	The unreliable Internet signal Outdated tools University infrastructure and facilities: Wi-Fi and Apple TV Availability of apps and facilities in classroom	6	16.21
Negativity of technology	Interrupting privacy Without technology, English learning can still develop. Impracticality of technology; always breaks down	2	5.4
Teachers' collaboration	Lack of cooperation between teachers Not being supported from colleagues	2	5.4
Total		**37**	**100**

The teachers' responses from the survey can be grouped into seven categories as presented in Table 4.2.7. The findings reveal that the teachers' limited technology skills and their lack of class time preparation were the biggest obstacles of integrating technology into curricula.

One teacher responded, "I often struggle with inadequate knowledge of particular technology … when I find it to be overwhelming or frightening, I'd rather not incorporate it into the curriculum". This response indicates teacher's awareness of his/her insufficient knowledge of

technology use. Moreover, many teachers reported that they did not apply technology into teaching because of too many teaching loads and responsibilities.

In addition, important if anecdotal evidence of teachers' lack of interest and confidence in using technology for teaching is that, prior to my data collection at the university, many teachers told me so. Thus, this result can directly answer my curiosity as to why many teachers did not integrate technology in the class and declined my request when I asked for their permission to observe their pedagogical practice to learn how technology is applied into their teaching.

Another factor hindering teachers' technology integration into curricula was students' low English proficiency. The teachers believed students were not ready because of their poor English language abilities, and they were not interested in learning with technology. However, these teacher survey results contradicted the students' positive opinion towards technology integration into instruction, which was earlier described in student aggregate result in Section 4.1.

About 16% of teachers worried that technology would cause students' distraction from the class contents. They also assumed that students would find ways to play games and use social media for fun in the class. A teacher reported that it was difficult to motivate students to use "work apps" because technology gave "the temptation for students to check Facebook, chat with LINE or play a game".

However, based on the findings from the student survey, the students stated that in the class they usually searched for more information on websites to understand the contents of the subject clearly. They said they often used YouTube videos for their self-study, and sometimes the videos could help them understand the lessons better than listening to the teachers' lecture. Therefore, the mismatch of the perceptions of technology use between teachers and students should be resolved and acknowledged for effective technology-enhanced learning and teaching.

The survey results in the table above also reveal that 16% of the teachers worried about infrastructure and Internet problems and the incompatibility between technology and course assessment.

According to my observation during data collection at UTCC, it appears that the university has been aware of the issues of inconvenient facilities and instability of Internet connection around campus. I noticed that the UTCC administration boards are improving the campus facilities and the infrastructure with higher speed Wi-Fi accessibility and well-equipped collaborative learning spaces to afford iHybrid learning with iPad technology.

In addition, it is worth noting that 2% of the teachers noted that they had concern about the lack of faculty collaboration that impeded technology integration. Perhaps this response indicates that support from colleagues is one of the important factors to produce new pedagogical practices.

In summary, the biggest obstacles that hindered teachers from incorporating technology were their low technological skills and limited time of class preparation. It is important that all of the obstacles should be recognized by teachers, teacher educators, and policymakers to find practical and compromising strategies to promote technology integration into pedagogy.

4.2.4.4 Teachers' Satisfaction with the University's Policies: Satisfied with the university's support of using iPads and technology in the class

It is apparent that institutional policies impact teachers' behaviors in incorporating technology into teaching. Thus, in this sub-section, teacher survey findings for item 19 about the teachers' satisfaction with the university's policies will be described followed by my interpretation.

Table 4.2.8 Teachers' satisfaction with the university's policies about technology integration (teacher survey, item 19)

Rank	Satisfaction with the university's policies	Mean
1	Encouraging the use of iPads and other technologies	3.97
2	Increasing technology integration	3.89
3	Creating iTunes U courses	3.70
4	The university's technological support and training	3.62
5	Technological infrastructure	3.57
6	The university's policy about taking online exams on iPads	2.65
Mean		**3.57**

The teacher survey findings in Table 4.2.8 show that the teachers were mostly satisfied with all university's policies according to the average group score (3.57). The policies of encouraging the use of iPads and other technologies (3.97) and increasing technology integration (3.89) were the top-rated for the teachers.

Overall, the teacher survey findings in the table above indicate that teachers were very positive about the university's policies regarding technology integration. However, they have not integrated technology into their teaching as expected based on my observation. It is possible that they are not confident with their technology skills and need more time to design their TELLT activities.

Perhaps the results of the teachers' satisfaction about the university's policies are because the teachers were required to write their email address in the survey. It is likely that the teachers may be cautious of their data confidentiality and might not reveal their true feeling towards the university's policies about technology integration. In other words, they may be afraid that the negative responses may affect the stability of their career. They may be aware that I need to present the study findings to the UTCC administrative boards when I go back to work as a teacher at the university after graduation.

On the other hand, taking online exams on iPads was the least satisfactory issue based on the lowest average score (2.65). This response may imply that taking iPad-based exams was a high-stake risk. Many teachers reported that they were concerned with the unreliability of Internet accessibility in the university and technical problems. The teachers may fear that some technological issues will make their exam invigilation chaotic.

It should be noted here that in Thailand, exam proctoring is administered by the Academic Affairs of the institution, and all faculties are responsible for proctoring midterm and final exams. So, it is one of teachers' main responsibilities that they must be certain that they can provide fair and smooth testing administration.

In summary, the teachers were satisfied with the university's policies about technology integration into pedagogy especially the support of using iPads and technologies in the class. However, they were worried about the university policy of taking online exams on iPads.

The next section will describe teachers' survey results of their technology application into pedagogy followed by my interpretation.

4.2.5 Teachers' Technology Application into Curricula

The previous teacher results and interpretation of sections 4.2.2, 4.2.3, and 4.2.4 from multifaceted perspectives have provided grounded knowledge and insights to further explore the teachers' technology application into curricula. The findings analysis of technology application will answer the fourth research question, "how do in-service teachers' perceptions of how they and student use technology inside and outside of the classroom impact how they apply technology to their pedagogical practices?"

In this section, the teacher findings and interpretation aim to illustrate how the teachers' pedagogical practices are informed by their digital technology use, their perceptions of students'

technology use, and their perceptions of technology integration into curricula. Thus, the teachers' technology application will be presented followed by my interpretation in two sub-sections:

4.2.5.1 Factors of selecting technology into teaching

4.2.5.2 Teachers' application of iTunes U courses and iPads into teaching

4.2.5.1 Factors of Selecting Technology into Teaching: Students' needs and teachers' expertise of using technology

This sub-section will describe teacher survey findings for item 26 followed by my interpretation.

Table 4.2.9 Factors of selecting technology in teaching (teacher survey, item 26)

Rank	Factors of selecting technology in teaching	n	%
1	Students' needs	7	18.92
	Teachers' expertise	7	18.92
2	Student motivation	6	16.21
3	University policy	5	13.52
4	Teachers' interest	4	10.81
5	Learning objectives	2	5.4
6	Ease of use	1	2.7
7	Others (e.g., usefulness and practicality of technology, best teaching method)	5	13.52
Total		**37**	**100**

The teacher survey results in Table 4.2.9 illustrate that about 37% of teachers integrated technology in their teaching based on students' needs and their expertise of technology. About 16% of teachers responded that student motivation was an important factor to choose technologies for their teaching. This response suggests that teachers prioritize the students' needs and motivation for their technology application. Many teachers reported in the survey that their main goal of using technology was to engage students in paying more attention to the class because students had low motivation to study English.

In addition, 15% of the teachers reported that the university's policies about encouraging technology integration affected their technology selection.

In summary, technology selection in the classrooms was based on students' needs, teachers' skillfulness of technology use, and students' motivation.

4.2.5.2 Teachers' Application of iTunes U Courses and iPads into Teaching: Used iTunes U courses to support students' self-study

In this sub-section, the teachers' survey findings for items 27 and 28 about the application of iTunes U courses and iPads into curricula will be described followed by my interpretation.

It is worth restating here that it is a key institutional policy that teachers use iPads as a teaching tool. As iPads are provided by the university to all teachers and students, the teachers are expected to design an iTunes U course for their subject and use their iPad to access iTunes U app to deliver the lectures, present teaching notes and slides and create engaging technology-enhanced learning activities.

The teacher survey results for item 27 reveal about 56% of teachers use iTunes U course as another online platform like Moodle. The teachers stated that course materials and assignments uploaded to iTunes U were useful for students' self-study before and after the class.

However, some teachers reported that their students rarely studied the materials in advance. This response is supported by the teachers' underestimation on the students' use of iTunes U and may lead to the fact that the teachers utilize iTunes U course merely for storing all learning and teaching resources. This result matches with the students' discussion results that the students found that many teachers did not constructively use iTunes U courses.

However, based on the teacher survey findings for item 27, about 8% of the teachers were interested in applying iTunes U courses productively. They reported that they posted assignments, checked students' work, and created a topic for class discussions.

Regarding the teachers' iPad use, the teacher survey results for item 28 indicate that about 80% of teachers claimed that they used iPads for their teaching. One said he/she used an iPad to "follow university guidelines". Another active teacher reported that he/ she used an iPad to "create class presentations; live assignment sharing with and among students in classroom via Apple TV; YouTube and photo search … Airdrop to share files with students; LINE group chat with students; making announcements and class arrangements".

About 35% of the teachers reported that they often used iPads outside the class to get access to iTunes U course, upload teaching and learning materials, and search for teaching resources.

Approximately 27% of the teachers stated that they seldom used an iPad for teaching, but they encouraged students to use it to review learning materials for their self-study. They also restated that they motivated students to use iPads to access iTunes U course materials for their self-study. One teacher wrote his/her response about his iPad use, "Not often, I urge my students to do their own searching at home. Most of the time, I have found students playing games in class by using iPad".

This response implies that the teachers may think that their accommodating behavior by encouraging students to use iPads demonstrates that they follow the university policy of iPad application.

The findings for "no" and "no responses" suggest that seven teachers (18%) might not use iPads in their teaching. It should be noted that the teachers' findings indicate that 45% of teachers were not convinced that using iPads was a good idea for teaching.

The examples of teachers' responses regarding their iPad application are listed below:

"I don't use an iPad in class. I'm kind of old school teacher but I always upload my lesson in iTunes".

"I rarely use iPad to my teaching in class as the Wi-Fi facility is sometimes inconsistent".

"Never think of using it".

In summary, most teachers used iTunes U courses only to make their teaching materials accessible online to support self-study of the students. Although it is mandated for UTCC teachers to use iPads for delivering their teaching, only 19% of teachers applied iPads in the classrooms.

The next section will move toward teacher professional development in relation to improving digital literacy skills.

4.2.6 Teachers' Evaluation on Digital Web 2.0 Technology-enhanced Activities in Improving Digital Literacy Skills: Preferred technological mentors the most and YouTube video creation

One of the key purposes of this study is to gain insightful understanding of teachers' evaluation of digital web 2.0 technology-enhanced activities. According to the reviewed literature in Chapter 2, developing digital literacies can start by learning to implement technologies in teachers' own practice. Thus, in this section, the teacher survey findings are presented followed by my interpretation to answer the fifth research question, "how do in-service teachers evaluate the usefulness and viability of various digital technological resources?"

In the teacher survey, teachers were asked to rate their preference on digital technological resources. Their responses will hopefully answer what are the most preferable technology-enhanced language learning and teaching activities to improve their digital literacies.

Table 4.2.10 Teachers' evaluation on digital web 2.0 technology-enhanced activities (teacher survey, item 20)

Rank	Digital web 2.0 technology-enhanced activities	Mean
1	Having a technology mentor / teacher tutor	4.14
2	Creating a YouTube video project	3.57
3	Creating a teacher website	3.54
4	Creating a digital storytelling project	3.46
5	Creating a Facebook page for teachers who are interested in technology	3.43
6	Creating a LINE group to discuss technology use	3.38
7	Creating a teacher blog	3.35
8	Creating an e-teaching portfolio	3.30
9	Creating a Twitter	2.08
	Mean	**3.36**

The teacher survey findings in Table 4.2.10 show that the average score of all digital literacy resources was slightly above average at 3.36. This score indicates that teachers may not be certain about the viability and the usefulness of the listed activities to promote their digital literacy skills.

However, the survey results reveal that many teachers preferred a technological mentor the most (4.14). The teachers added that a mentoring system would help them to be more confident in using technologies. This may be because teachers find it is useful and convenient to have a teacher counselor to train them to use digital technology as they are aware of their average digital literacy level (Q22 = 3.22).

Referring to all digital technology resources in the table above, the average score of each activity was similarly average at 3.00 except using Twitter (2.08). This implies that teachers did not think using Twitter was effective to develop their digital literacy skills as other social media tools.

Based on the above results, creating a YouTube video (3.57) and a teacher website (3.54) were their most preferable digital web 2.0 technology-enhanced activities besides having a

technological mentor. Therefore, this can be a starting point for organizing a future teacher training by implementing a video creation project for teachers to develop teachers' digital literacy competencies.

In summary, the teachers thought gaining help from technological mentors was the most practical for them to develop their digital literacy skills. In addition, they were interested in creating YouTube videos and a teacher website to learn to use digital technologies by doing.

4.2.7 Teachers' Understanding of Digital Literacy Concept

As the goal of this study is to raise awareness of teachers towards the necessity of their digital literacy development, it is vital to assess teachers' understanding of digital literacy.

The teacher survey findings of teachers' perceptions of digital literacy will be presented in two sub-sections followed by my interpretation.

4.2.7.1 Teachers' definition of "digital literacy"

4.2.7.2 Teachers' perception of the necessity of digital literacy instruction

4.2.7.1 Teachers' Definition of "Digital Literacy": Referred to only functional skills of technology use

The teacher survey results for item 21 about teachers' digital literacy definition reveal that most of the teachers (81%) basically addressed the concept of digital literacies only as the "functional IT skills" based on White's (2015) Digitally Literate Teacher (DLT) framework. Many teachers defined "digital literacy" as skills and knowledge of using digital technologies. The following are some definitions of digital literacies by the teachers.

"The ability to participate in online society by using digital devices, e.g., smart phones, laptops, tablets and online applications to communicate and express your knowledge".

"The ability to understand how words are meant in operating devices and materials".

"Ability to navigate through different media easily and understand how they work and what they are for".

"Feeling comfortable at using technologies".

About 8% of the teachers expanded their understanding of digital literacies to confidence in technology use and appropriate selection of tools for participating in online communities. One teacher defined digital literacy as "the way we can apply new technology into use and be able to choose the most appropriate type of technology and make the most of it for the benefit of your work".

Only 5.4% of teachers seemed to understand digital literacies more thoroughly. A teacher who studied simulation game-enhanced language learning gave a long definition of digital literacy that focuses on multiliteracies:

"… new forms of the traditional literacy … more multiple and dynamic … in new ways of meaning making and communicating with others through multimedia and multimodal forms … related to social practices …. They [blogs and Facebook] facilitate the creation of text-based postings and rich media using multimodal signs of words, hyperlinks, sounds, moving images and videos to construct meanings and communicating information about a topic".

It should be remarked here that teachers' definitions of the term "digital literacy" in comparison with the students' definitions imply that the students apparently had broader understanding about digital literacy than the teachers. The students' definitions were outstandingly more extensive than the teachers' explanations, which focused on only skills of using digital devices. The students' definitions of "digital literacy" addressed the critical awareness of digital risks, authenticity, and information literacy that the teachers did not refer to in their "digital literacy" definitions.

The teacher survey results show that the self-assessment average score of teachers of digital literacy skills was average as 3.22. The teachers also thought that they outperformed other senior teachers according to their higher average score to 3.49. However, the teachers acknowledged their lower abilities of digital literacy in comparison with their students based on their reduced average score to 2.95.

In summary, teachers' definitions of the term "digital literacy" reveal that most teachers understood that the digital literacy concept was mainly associated with the skills and knowledge of using computers, applications, and digital technology. The teachers' self-evaluation score for digital literacy level was roughly average at 3.22. They believed their students' digital literacy was higher than their own, and the students also felt the same.

4.2.7.2 Teachers' Perceptions of the Necessity of Digital Literacy Instruction: Most agreed to include digital literacy training in English curricula

This sub-section will describe teacher and student survey findings of the teachers' perception of the necessity of digital literacy interaction for item 25 followed by my interpretation.

The teacher and student survey results show that the majority of teachers (67.57%) thought that digital literacy instruction should be integrated into English curricula. Most teachers also gave several reasons to support digital literacy training. For example, students should have guidance in using digital technologies because there were a wide range of essential digital literacy skills.

Some teachers emphasized that it was important to teach students to use educational apps for their self-study because they were useful for learning in the digital age. The teachers also stated that digital literacy training could enhance students' learning and broaden their knowledge and

perspectives. In addition, the teachers believed that digital literacy is "a major part of our daily lives" and "new ways of language learning as well as new identity construction".

Moreover, a teacher highlighted that a good teacher should be open-minded and adaptable to a change toward innovative technology-enhanced teaching methods to afford students' self-regulated learning in this modern digital age.

However, about 30% of the teachers disagreed with the notion of digital literacy instruction. The teachers added that digital literacy could be "trained", but not "taught". They stressed that teachers should focus on the course content, not technology. Moreover, they believed that nowadays young students were already skillful in using digital technologies.

There were some strong comments opposed to digital literacy teaching that should be recognized as follows:

"modern technology is unreliable especially Wi-Fi going down"

"too new to know"

"too heavy workload"

"the same results may be achieved by using books"

The teachers' negative attitudes toward digital literacy instruction were restated. They could be useful for policymakers and teacher educators to recognize the problems and investigate these issues in-depth to create a strategic, practical action plan to tackle these challenges.

In summary, about 67% of teachers believed it was essential to integrate digital literacy instruction into English curricula because, in the age of digital technology, students needed to develop digital literacy skills. However, some teachers raised the issues of the students' expertise in digital technology use, overloads of teaching and the unreliability of modern technologies that account for their disagreement with digital literacy instruction.

4.2.8 A Summary of the Teachers' Findings and Interpretations

The number of teacher participants in this study were 37 who were experienced English language teachers. Most of them were seniors and have taught at this university for more than 10 years.

Because the hybrid learning system demands all teachers to use iPads and create iTunes U courses in their teaching and learning, the teachers are expected to use iPads and design iTunes U courses in their pedagogy.

To make the summary clear, all teacher findings will be divided into five aspects following the sequence of five research questions as follows:

4.2.8.1 Teachers' Digital Technology Use for Academic and Non-academic Purposes (RQ1)

The teachers often used websites, emails and YouTube for academic purposes, but seldom used social media. LINE was also moderately used for communication between teachers and students. Instagram and Twitter were ranked at the bottom of the list. For non-academic purposes, the teachers enjoyed surfing websites, using LINE and watching YouTube videos most, but playing games was the least favorite activity. The teachers spent most of their time on the LINE app, online news and YouTube every day. Finally, the teachers stated that they would like to learn to use digital technologies by doing.

4.2.8.2 Teachers' Perceptions of Students' Digital Technology Use (RQ2)

The teachers predicted correctly that students used technology for academic purposes less often than for non-academic purposes. Apparently, the teachers were aware of the widely-accepted technologies among students. For instance, they were right that the students' most popular digital technology use for academic purposes was YouTube.

According to the student survey results, YouTube videos were very useful because students could gain knowledge for learning English as well as enjoy a variety of entertainment genres.

In addition, the teachers could provide the highly-ranked technology used by students correctly, YouTube, mobile apps, and iTunes U. Additionally, the teachers correctly ranked the six top-rated technology used by students for non-academic purposes: LINE, YouTube, Facebook, mobile apps, games, and websites, although there was a mismatch of their ranking. For example, the students' most popular technology for pleasure was websites, but the teachers assumed that they enjoyed LINE and YouTube the most.

In conclusion, the teachers underestimated the students' technology use for academic purposes (-0.30), but overestimated their technology use for non-academic purposes (0.20). These scores imply that the teachers believed students mostly used technology for non-academic purposes. As a result, some teachers did not allow students to use technology in the class. This can be inferred based on teachers' underestimation of the students' technology use for academic purposes. Thus, teachers should be more cautious and open to observe students' technology use in the class. The teachers need to develop their better understanding of the students' new learning styles in the age of digital and mobile learning.

4.2.8.3 Teachers' Perceptions of Technology Integration into Curricula (RQ3)

Most teachers felt positive about digital technologies. They believed technology-enhanced language teaching could engage students in learning, develop their learning proficiency, and make learning enjoyable.

However, they were worried about students' distraction due to technology use in the class, the technological problems, and longer class preparation. These were the main barriers for

technology integration. They also reported that students' poor English skills and their low motivation impeded them most from incorporating technology into curricula.

More importantly, the biggest obstacles that hindered teachers from integrating technology were their low technological skills and limited time for teaching preparation.

In general, the teachers were satisfied with the university's policies that supported the iPad use and technology integration into the class. However, they were not very certain about the potential of the policy relating to taking online exams on iPads.

4.2.8.4 Teachers' Technology Application into Curricula (RQ4)

The teachers considered students' needs, their own expertise of technology use, and students' motivation as prioritized criteria to select technology for teaching.

Based on the teacher survey findings, only 19% of teachers used iPads to deliver their teaching as expected by the university. Many teachers used iTunes U courses as merely an online storage of teaching and learning resources for students' self-study outside the class. Therefore, at present, the teachers did not apply iPads and iTunes U courses or other digital technologies and social media to create constructive learning activities.

4.2.8.5 Teachers' Evaluation of Digital Technological Resources and Their Understanding of Digital Literacy Concept (RQ5)

The teachers believed that having technological mentors and creating YouTube videos and teacher websites helped them develop their digital literacy skills.

Most teachers thought digital literacy involved only the functional skills of using computers and digital tools. Thus, they rated their digital literacy level as average (3.22) and lower than their students. The findings reveal the teachers were aware of their limited digital technology skills, so they wanted to receive more technology training.

In addition, many teachers believed digital literacy instruction into English curricula was necessary. They were conscious that in the digital age, there were a number of essential digital technology skills for students to learn to develop their knowledge and academic skills. However, some teachers thought it was unnecessary to teach digital literacy because the younger generation were already well-equipped and expert with digital technology skills. Moreover, the teachers admitted that they did not have time to implement technology into class because of too heavy workload. They also felt overwhelmed by emerging technology inventions and the unreliability of technology.

In the next chapter, Chapter 5, the results of three case studies – Bee, Sam and Ning – will be exhaustively described. Their individual teacher profile contains their digital technology use, digital literacy skills informed by TPACK and DLT frameworks, perceptions of technology integration, and their technology application into classrooms.

CHAPTER 5: A CASE STUDY OF THREE TEACHERS

This chapter describes the findings and analysis that focus on three case studies: Bee, Sam, and Ning. Each teacher profile will be described in-depth in individual sections and in comparisons to gain better understanding of their digital technology use, perceptions of technology integration, students' technology use, and technology application strategies into their pedagogical practices. The comparisons of three teachers' digital literacies are essential to address in great detail because the teachers' strength and weaknesses in each area could provide a more vivid picture in order to promote teacher education about digital literacy and technologies. There will be six sub-sections in this section as follows:

5.1 Bee – "the thoughtful player"

5.2 Sam – "the cautious facilitator"

5.3 Ning – "the rigorous trainer"

5.4 The three teachers' digital literacy competence informed by technological pedagogical content knowledge (TPACK) framework

5.5. The three teachers' digital literacy competence informed by digitally literate teacher (DLT) framework

5.6 A summary of the overall findings and interpretations

Three Teacher Profiles

The goal of this study is to assess digital literacies of English language in-service teachers in Thailand and explore their attitude toward technology-enhanced language learning and teaching. Therefore, I investigated in more detail three teachers who shared their use of technology, perceptions of students' technology use, attitudes toward new digital technology, and technology integration into curricula.

To triangulate the findings of the three case studies, I employed the teacher and student surveys, student focus group discussions, the teachers' interviews, learning artifacts, and my reflective field notes from class observations to examine three teachers' digital literacies and investigate their application of technology into their pedagogy.

Three nicknames were selected to describe their characteristics: Bee as "The Thoughtful Player", Sam as "The Cautious Facilitator" and Ning as "The Rigorous Trainer". The results and interpretations of individual profiles will be elaborated under the same seven topics as follows:

1. The teacher's background information
2. The teacher's digital technology use for academic and non-academic purposes
3. The teacher's perceptions of students' digital technology use
4. The teacher's perceptions of technology integration into curricula
5. The teacher's technology application into curricula
6. The teacher's evaluation of digital web 2.0 technology-enhanced activities in improving digital literacy skills
7. A summary of the teacher's findings and interpretations

5.1 Bee – "The Thoughtful Player"

Bee was titled as the "thoughtful player" for she thought carefully when she planned the content and class activities to meet course objectives and students' interest. Bee also integrated fun, gamified activities to play with students every session. Her results will be presented orderly into seven sections followed by my interpretation.

5.1.1 Bee's Background Information: Active Ph.D. graduate

Bee is a new Ph.D. graduate in English Language Studies from Thammasat University, a well-known Thai public university. She is 37 years old. She has taught English for nine years.

She was a part-time teacher here and at Silapakorn University. She has just started work in the Business English program at the school of HMA, UTCC, in 2017. This semester she taught only one course, English for Communication 2 (HG010). However, she had to teach six classes or 18 hours a week.

She was also in charge as a course coordinator of HG010, a team teaching core course offered for all first-year students from every school. As a course coordinator, Bee coordinated with ten teachers and prepared core teaching materials, worksheets and quizzes as well as uploaded all teaching resources to iTunes U course of HG010 for other team members. In other words, the other HG010 teachers did not have to upload all files, but they had responsibility in designing lesson plans, learning activities and course evaluation.

5.1.2 Bee's Digital Technology Use: Not engaged with social media

The results of Bee's digital technology use will answer the first research question, "what new digital technologies do in-service teachers and students use for academic and non-academic purposes?" In this section, I will present the findings of Bee into two sub-sections followed by my interpretation as follows:

5.1.2.1 Bee's digital technology use for academic purposes

5.1.2.2 Bee's digital technology use for non-academic purposes

5.1.2.1 Bee's Digital Technology Use for Academic Purposes: Used mainly websites and iTunes U course

In this sub-section, I will describe Bee's survey findings about her digital technology use for academic purposes followed by my interpretation.

Table 5.1.1 Bee's digital technology use for academic purposes (teacher survey, item7)

Technology use for academic purposes	Bee	Technology use for academic purposes	Bee
Websites	5	Twitter	1
iTunes U courses	5	Instagram	1
YouTube	4	Skype	1
Mobile apps	3	LINE	1
Wikis	2	Facebook	1
iPads	1	Games	1
Social network sites for language learning	1	Pinterest	1
Blogs	1	Clickers	1
Emails	1	**Mean**	**1.82**

The survey findings in Table 5.1.1 show that Bee was not very engaged with digital technologies for academic purposes (1.82). This is surprising, because she is the youngest of the department. One might expect she would be more comfortable with technologies, but she seldom or never integrated social network sites (1), blogs (1), Twitter (1), Instagram (1), Facebook (1), or online games (1) into her class. Although she reported no usage of LINE (1) in her teaching, I noticed she usually used it to keep in contact with her students and announced some important class meetings, deadlines of homework submission and quiz dates. This usage suggests Bee assumed social media is only a means for class communication, not a meaningful tool for her pedagogical practices.

The minimal use of social media in her class may be because Bee believes "We are not like Engineering School where technology is so important. But, for teaching a language we can teach without technology and learning can still be fun like in the past." This attitude can prevent Bee from exploring the potential affordance of social media to be applied in her class, which would explain their low scores. The results of Bee indicate that Bee thinks social media is not always plausible or useful for academic purposes.

Bee always used iTunes U course (5) as a "tool for students to review the lessons and prepare themselves for next class meeting", which is required by all UTCC teachers. She always used English grammar websites (5) and YouTube videos (5) as "sources of knowledge of students". She sometimes used dictionary apps and mobile apps (3) to play games with the students as a lesson revision in every session. Bee said, "Now we can use technology to facilitate teaching and learning ubiquitously, why not use it?"

Her usage and comment indicate that Bee is risk-taking in exploring new teaching approaches augmented by digital technology. Bee restated that she applied Kahoot games to increase students' attention in learning, and she knew most of her students were addicted to online games. Based on the interview findings, she believed using digital gamified activity is a fun and effective tool in motivating young students in paying attention to her lessons.

The survey findings (Q16) also reveal that Bee was willing to learn and engage with technologies and to receive more training. She also rated a high level with respect to confidence about choosing appropriate digital tools to support teaching. This may be because Bee took some courses about technology use and recently received a doctoral degree in English Language Studies. Moreover, since Bee had experience in working part-time at another university where technologies are integrated into instruction, this overall experience can possibly contribute to her confidence in selecting suitable technological tools for her pedagogical practices. From my class observation, Bee is a dedicated, responsible teacher who knows and plays her role very well.

In summary, Bee liked to search for extra English grammar websites and YouTube videos to teach her students about English listening skills and vocabulary retention. To follow the university's policy, she always assigned students to view learning materials on the iTunes U course for their self-study. Bee had become interested in using Kahoot online games to make

learning more fun and engaging. She took initiative and was confident in choosing and applying technology in her English class to match students' learning needs. She can be considered as a beginner in using technology in teaching.

5.1.2.2 Bee's Digital Technology Use for Non-academic Purposes: Not interested in using social media

In this sub-section, I will describe Bee's survey findings about her digital technology use for non-academic purposes in Table 5.1.2 followed by my interpretation.

Table 5.1.2 Bee's digital technology use for non-academic purposes (teacher survey, item10)

Technology use for non-academic purposes	Bee	Technology use for non-academic purposes	Bee
Websites	5	Wikis	2
Emails	5	Blogs	1
LINE	5	Twitter	1
Facebook	5	Instagram	1
YouTube	5	Skype	1
iPads	3	Games	1
iTunes U courses	3	Pinterest	1
Mobile apps	3	**Mean**	**2.8**

Regarding the use of technologies for non-academic purposes, Bee's score was 2.80. Thus, this shows Bee was not interested in using new social media such as blogs, Twitter, Instagram, Skype, and Pinterest (all rated as = 1). She also did not like to play online games (1). However, she always read from websites (5) and watched YouTube videos (5). She also used emails (5), Facebook (5), and LINE (5) to contact her family and friends. However, based on my observation as her Facebook and LINE friend, she did not regularly post photos or share any updates on these digital spaces. In actuality, Bee is quite introverted and enjoys living in privacy and in her comfort zone.

In summary, Bee spent most of her free time surfing websites, watching YouTube videos, and using LINE and Facebook. She seldom used Twitter, Instagram and never played online games. Although the survey results show Bee felt most comfortable with using technologies for fun (Q16h = 5), she was not yet ready for exploring new social media and might not see high value of social media and related technology for academic purposes.

In the next section, I will describe Bee's opinions about her students' digital technology use for academic and non-academic purposes.

5.1.3 Bee's Perceptions of Students' Digital Technology Use: Underestimated the technology use for study but overestimated its use for fun

The data from Bee's responses on the teacher survey and her interview transcriptions were interpreted to answer the second research question, "what are in-service teachers' perceptions of how students use technologies for academic and non-academic purposes?" Bee's survey results for two sub-sections will be presented followed by my interpretation.

5.1.3.1 Bee's perceptions of students' digital technology use for academic purposes

5.1.3.2 Bee's perceptions of students' digital technology use for non-academic purposes

5.1.3.1 Bee's Perceptions of Students' Digital Technology Use for Academic Purposes: Highly underestimated the use of Facebook, Instagram and LINE

Bee's results related to her perceptions of students' digital technology use for academic purposes from the survey item 13 are described below followed by my interpretation.

Table 5.1.3 Bee's perceptions of students' digital technology use for academic purposes (teacher survey, item13)

Technology use for academic purposes	Bee's perceptions	Students (*n* = 58)	Bee - Students
a) iTunes U courses	5	3.84	1.16
b) YouTube	5	4.10	0.90
c) Websites	4	3.66	0.34
d) iPads	4	3.60	0.40
e) Mobile apps (e.g., online dictionary)	3	4.05	-1.05
f) Social network sites for language learning	3	3.04	-0.04
g) Wikis	3	2.62	0.38
h) Blogs	3	2.48	0.52
i) Emails	2	2.43	-0.43
j) Skype	2	1.74	0.26
k) Games	2	2.95	-0.95
l) Twitter	1	2.78	-1.78
m) Instagram	1	2.88	-1.88
n) LINE	1	2.81	-1.81
o) Facebook	1	3.33	-2.33
p) Pinterest	1	2.38	-1.38
Mean	**2.56**	**3.04**	**-0.48**

Based on the teacher survey results in Table 5.1.3, it seems unusual that Bee as an active teacher and facilitator underestimated the students' digital technology use for academic purposes (BQ13 = -0.48). Bee extensively underestimated the students' use of Facebook (-2.33) Instagram (-1.88), LINE (-1.81), Twitter (-1.78) for studying English. Also, Bee did not realize that the students frequently used mobile apps for learning English (-1.05).

This conflicts with her interview that she felt the students were inclined to use emerging digital technologies in learning English. It may be because Bee may not be fully aware of the big influence of digital technologies towards her students' technology use. As she rarely or never used a variety of new social media for academic purposes, she may not be able to know the benefits of these technologies for learning English as much as her students did.

However, Bee greatly overestimated the students' use of iTunes U (1.16), YouTube (0.9), web blogs (0.52) and Wikis (0.38). This may imply that Bee did not realize that her students did

not see the benefits of these technologies in practicing using English. Instead, the students found other innovative channels in learning English through Facebook, LINE, Twitter, and Instagram, again supporting their preference for social media over other digital tools.

In summary, Bee's underestimation of students' use of Facebook most, then Instagram and LINE, informs that teachers may need to have more communication with their students to learn and understand their new learning styles afforded by digital tools and social media.

5.1.3.2 Bee's Perceptions of Students' Digital Technology Use for Non-academic Purposes: Overestimated students' technology use especially Skype

Bee's results related to her perceptions of students' digital technology use for non-academic purposes from the survey item 14 are described below followed by my interpretation.

Table 5.1.4 Bee' perceptions of students' digital technology use for non-academic purposes (teacher survey, item14)

Technology use for non-academic purposes	Bee's perceptions	Students (*n* = 58)	Bee-Students
a) Websites	5	4.86	0.14
b) Mobile apps	5	4.47	0.53
c) Twitter	5	3.47	1.53
d) Instagram	5	3.91	1.09
e) Skype	5	1.63	3.37
f) LINE	5	4.37	0.63
g) Facebook	5	4.21	0.79
h) Games	5	4.02	0.98
i) YouTube	5	4.70	0.30
j) Emails	5	2.16	2.84
k) iTunes U courses	2	2.74	-0.74
l) Wikis	2	2.52	-0.52
m) Pinterest	2	2.48	-0.48
n) Blogs	1	2.6	-1.60
Mean	**4.13**	**3.44**	**0.69**

The teacher survey results in Table 5.1.4 show that Bee overestimated the students' digital technology use for non-academic purposes (0.69). Bee assumed that the students used digital tools and social media every day to play games, chat, share photos, and create multimodal

stories. Bee believed that students were digitally-oriented who assimilated digital skills naturally from their upbringing and the environment of social media communities.

One outstanding difference between Bee's perceptions and students' digital technology use for non-academic purposes was the of use Skype (3.37) most, then emails (2.84), Twitter (1.53), and Instagram (1.09). On the contrary, Bee underrated the use of blogs (-1.60) the most, then iTunes U courses (-0.74), Wikis (-0.52), and Pinterest (-0.48). It appears that she considered these tools were not to be popular for pleasure among the students; however, they were quite interested in engaging in it in their leisure time. Therefore, this finding may give her insights to incorporate blogs into her class activities in the future.

In summary, Bee overestimated the students' digital technology use for non-academic purposes for almost all types except blogs, iTunes U, Wikis and Pinterest. In addition, in comparison to Sam and Ning, Bee's assumption about the students' technology use was the most different from the students' technology use. This may be because as a new faculty of the university, she is not very familiar with the UTCC students' learning styles and their habits with technologies. Thus, this finding is a good call for new teachers to survey students' needs and wants prior to designing class activities and content.

5.1.4 Bee's Perceptions of Technology Integration into Curricula: Open-minded and positive with the use of digital technologies

Bee's responses on the survey and in the interviews are used to answer the third research question, "what are in-service teachers' and students' perceptions of technology integration into curricula?". In this section, I will present Bee's survey results for three sub-sections followed by my interpretation.

5.1.4.1 Bee's general perceptions of technology integration into her teaching

5.1.4.2 Bee's perceptions of different barriers to integrate technology into curricula

5.1.4.3 Bee's satisfaction with the university's policies about technology

5.1.4.1 Bee's General Perceptions of Technology Integration into Her Teaching: Time-saving and useful for engaging the class

Referring to the interview findings with Bee, technology was useful for both teachers and students. For teachers, Bee highlighted that she had three goals in integrating technology in her class: 1) increasing students' participation and motivation in learning; 2) making learning fun, more engaging; and 3) lessening the burden of teaching preparation and saving time to write lecture notes on the whiteboard.

Technologies such as YouTube provided huge teaching materials and resources so that teachers did not need to make their own teaching resources and could selected YouTube videos about teaching English vocabulary to students to learn outside the class. Technologies also saved a lot of class preparation time. Bee raised the point that the YouTube materials helped teachers not fear giving the wrong answers of the grammar exercises as the online grammar exercises provided the key.

In Bee's class, many types of content-related games were created on the Kahoot app as an assessment tool to inform both Bee and the students about their learning performance. The students could observe their language proficiency level and understanding of the lessons compared to other classmates through answering a quiz game on Kahoot in the class. Bee found that gamified activities were useful for her. For example, gaming facilitated Bee's ability to identify the weak students to whom she could give assistance and more instruction.

Regarding the benefits of technology for students, Bee stated that technology helped them "not rely on teachers, but we can just give advice how to choose technology ... and as the class time is limited, so it is impossible to develop students' learning".

In summary, Bee discovered that iTunes U courses, YouTube videos, and the Kahoot app were beneficial and essential to her teaching, especially for a big class, such as saving class preparation time and motivating students in learning. This finding may suggest that other teachers implement easy gamified tasks as a monitoring tool to observe students' learning progress and understanding. Games can also simultaneously stimulate student' engagement in the content of the course.

5.1.4.2 Bee's Perceptions of Different Barriers to Integrate Technology into Curricula: Encountered many high barriers

In this sub-section, I will describe what Bee thinks about different barriers that hinder her from integrating technology into curricula followed by my interpretation.

Table 5.1.5 Bee's perceptions of different barriers to integrate technology into curricula (teacher survey, item17)
The scale ranges from a very high barrier (1) to a very low barrier (5).

Different barriers to integrate technology into curricula	Bee	Different barriers to integrate technology into curricula	Bee
English proficiency of students	3	Technology and Internet access	1
Personal motivation	2	Assessment aligned with technology use	1
Collaboration with other teachers	2	Technical problems in the classroom	1
Time for teaching preparation	2	Institutional policies and administration	1
Classroom management	2	Teaching loads and responsibilities	1
Subject content	2	Technological skills of my own	1
Teaching methods and styles	2	Technological skills of students	1
Technological training and support	1	Motivation of students	1
University infrastructures and facilities	1	Learning styles of students	1
Budgeting for new technologies (apps)	1	**Mean**	**1.42**

The teacher survey results in Table 5.1.5 show that Bee encountered many big barriers that hindered her from integrating technology (BQ17 = 1.42). Bee rated 1 for 12 factors as very high

barriers. Bee rated technology and Internet access as a very high barrier. She said when there was no Internet connection and she could not log in on Kahoot website on the computer, she felt it was a waste of her time because an online Kahoot game and YouTube videos that she spent the whole day creating were useless. She was frustrated and had to think promptly about new teaching methods to replace the technology-based activities. Bee concluded that integrating digital technology in the class effectively depends on the good quality of Internet accessibility.

The only topic that Bee found not a big problem was English proficiency of students (3). This may be because Bee believed young generation was capable of using digital technologies although they did not have good language proficiency. They seemed to be initiative and active in operating digital tools to gain benefits from online world and social media. Therefore, she believed the low English proficiency level of students might not cause a big problem for her in creating technology-enhanced teaching activities. As stated earlier, Bee was confident in her ability in selecting suitable learning methods for her students.

Bee acknowledged her low technology skills as a high barrier (1); therefore, she believed that it was crucial for teachers to have high confidence in using technology before applying it to the class; otherwise, it would waste class time.

Bee additionally insisted that an individual's attitude was important. Bee believed that positive attitude was the key. She was convinced that if the teachers were open to try to use technology, they would realize that it worked well and much better than traditional teaching. She said, "now we can use technology to facilitate teaching and learning ubiquitously, why not use it?"

Bee was aware that it would take some time for some senior teachers disinterested in technology to take a risk and make trials in integrating technology into teaching. She further

suggested that changing their negative attitude toward technology might start from sharing a good practice of technology integration and demonstrating how to use technology tools to faculty members in a small group meeting. She highlighted, "we can make it like a [of] sharing information first and share what others [are] interested and then we can organize a coffee talk for technology application into classes especially good tools for teaching". This implies that a friendly learning atmosphere about technology use is important. It can foster a good cooperation and rapport among teachers in order to invent a community of innovative technological practice in the future. I assumed that Bee may be a good, supportive technology mentor for her colleagues regarding the use of Kahoot games.

In summary, although Bee thought that technology was useful, such as saving her teaching preparation time and accessing online authentic teaching and learning resources, she discovered a number of high barriers. Bee's experience seems to suggest that teachers in this digital age needed to learn and adjust themselves to teach digital students by integrating meaningful technology-enhanced lessons into curricula. Importantly, being open-minded and risk-taking to acquire emerging technology skills are essential characteristics of digital teachers.

According to the above findings that Bee rated institutional policies and administration as a very high barrier, the next findings will reveal the policies with which she felt unsatisfied.

5.1.4.3 Bee's Satisfaction with the University's Policies about Technology: Satisfied with technology integration policy

In this sub-section, I will describe Bee's survey findings for item 19 followed by my interpretation.

Table 5.1.6 Bee's satisfaction with the university's policies about technology (teacher survey, item19)

The university's policies about technology	Bee
a) The university's technological support and training.	4
b) The university's technological infrastructure.	4
c) Increasing technology integration.	4
d) Creating iTunes U courses.	4
e) Encouraging the use of iPads and other technologies.	4
f) Taking online exams on iPads.	3
Mean	**3.83**

The teacher survey results in Table 5.1.6 reveal Bee's satisfaction level with the university's policies about technology (3.83) was high. Bee gave high satisfaction (4) to almost all items except the advantages of taking exams on iPads (3). She would be worried if there were a technical problem due to the unreliability of Wi-Fi connection because it would cause a disastrous "effect" on the testing performance and the logistics of exam administration.

In summary, Bee was interested in integrating technology into curricula as it afforded teaching and learning with authentic online resources. It also helped engage students to pay more attention to the course content. Although Bee reported many obstacles for technology integration, she was continually learning to incorporate digital technologies into her pedagogy practices due to many technology potentials. Bee's high score about technology policies of the university can support my interpretation that Bee is positive about technology integration into pedagogy

5.1.5 Bee's Technology Application into Curricula: Created gamified activities with Kahoot app

This section focuses on data on Bee, which were collected from two class observations and two interviews and interpreted to answer the fourth research question, "how do in-service teachers' perceptions of how they and students use technology inside and outside of the

classroom impact how they apply technology to their pedagogical practices?" I will present Bee's results followed by my interpretation.

According to the students' report, Bee was understanding and kind to the students, so they admired and respected her. She has good communication skills and can explain the lessons clearly. She taught one course, English for Communication 2, to six groups of first-year students, so she said this was an advantage of technology that could save her time from having to write lecture notes on the whiteboard six times.

She mainly employed the iTunes U course as a "tool for students to review the lessons and prepare themselves for next class meeting". She uploaded grammar worksheets, teaching slides, videos for listening practice, and examples of grammar explanation.

The main factors which influenced Bee to select technology besides iTunes U were students' needs and its alignment with the course objectives. Bee conducted a student survey with the Kahoot app in the first class to explore students' needs, wants, and objectives in studying English.

Bee had discovered the Kahoot app about a year before because her Engineering students introduced it to her in the class. Then she noticed that her students were addicted to checking messages on LINE, updating Facebook, and playing mobile games in the class. So she took initiative in applying the Kahoot gamified activity as a lesson review and assessment tool in the form of choosing a correct response from multiple choices. This teaching strategy can check the students' understanding as a group and it was more productive and time-saving than walking towards each student and supervising individuals. She said games not only increased students' motivation and enhanced their understanding of the content, but also helped her distinguish good and poor students.

She also used PowerPoint and PDF slide presentation, English grammar drill websites, and video clips from YouTube, such as “The Voice USA”, “Wrong Say Do”, and “Loukgolf’s English Room” to expose themselves into the world of digital tools and media that provides invaluable authentic resources for English skill development. In the class, she also encouraged the students to look up words and check pronunciation on Google and online dictionary apps by themselves without interrupting the class. She believes these technologies were essential for students to make them understand the content and more motivated and continually watch the videos for their self-study.

In summary, Bee restated that she was not technology savvy, but she was open to learn new technologies and valued their leverage in engaging students in English learning. She never plays games for fun, but she is willing to create gamified activities in the class as she knows they can motivate students in the lessons. She intended to attend iBook creation workshops that she believes is useful for her class. Bee is planning to use a new mobile app to motivate students in learning English and boost their memorization in grammar and structure in every class.

This indicates she is willing to leave her comfort zone to experiment with digital tools if they can be useful for her teaching and for her students. She is dedicated in her teaching and cares about her students’ learning progress. Bee had no fear for trying out new technologies in the class with the students as she believed she was a learner and class facilitator.

In the next section, I will describe Bee’s survey results for her evaluation of the usefulness of various digital web 2.0 technology-enhanced resources followed by my interpretation.

5.1.6 Bee's Evaluation of Digital Web 2.0 Technology-enhanced Activities in Improving Digital Literacy Skills: Preferred having technology mentors most

As can be seen from the findings, when conducting a teacher technological training program, it is important to be aware of teachers' needs and preference. Thus, in this section, Bee's survey results for her evaluation of digital web 2.0 technology-enhanced activities followed by my interpretation are presented to answer the fifth research question, "how do in-service teachers evaluate the usefulness and viability of various technological resources?"

Table 5.1.7 Bee's evaluation of Digital Web 2.0 Technology-enhanced Activities (teacher survey, item 20)

Digital web 2.0 technology-enhanced activities	Bee
a) Having a technology mentor / tutor	5
b) Creating a YouTube video project	5
c) Creating a digital storytelling project	5
d) Creating a Facebook page for teachers	4
e) Creating a LINE group to discuss technology use	4
f) Creating a teacher website	3
g) Creating a teacher blog	3
h) Creating an E-teaching portfolio	3
i) Creating a Twitter	3
Mean	**3.89**

Based on the results in Table 5.1.7, Bee's average score (3.89) was high that it indicates Bee supported the use of digital web 2.0 technology-enhanced activities in the list for digital literacy development. Bee rated her preference very high as 5 for three activities: having technology mentors, creating YouTube videos, and digital stories.

She reported that she believed technology mentoring is the best strategy to promote digital literacy as it is "more convenient and faster" to learn technological skills in a small close group of teachers. According to Bee's remarks, she asked her colleague to help her solve some technological problems and become more confident in integrating technology into teaching. In contrast to workshops and training offered by the university, Bee stated that they were too formal

and were arranged only occasionally. This suggests that the teacher mentors' assistance and guidance are believed to make learning easier because teachers could receive quick responses and friendly technological support from their colleagues.

According to Bee's interview findings, she preferred multimedia tasks which are more attractive than merely writing. She was interested in creating digital stories (5) as she said they could be completed in a short period of time and foster her creative thinking skills. Unlike LINE, Facebook, websites and blogs, she said these activities required longer time to compose texts for a topic discussion. Bee thought teachers had a number of responsibilities and teaching loads and they also did not like writing a diary, so blogging did not work for her and, it may be assumed, for others.

In summary, Bee believed receiving assistance from technology mentors, creating YouTube videos, and making digital stories were very useful and productive to develop her digital literacy skills. These can boost her confidence and save her time in experimenting with new technology-enhanced learning and teaching. Bee may want to receive technology training that is based on using social media and mobile classroom apps in the classroom. For this matter, Ning (see Section 5.3) might be appropriate to be her mentor as she was skillful in using mobile apps.

5.1.7 A Summary of Bee's Findings and Interpretations

Bee is a thoughtful and active teacher and a team-player. She was not a social media user and technology savvy. However, as a young teacher, she was open to use and learn new digital technologies that could be useful for her teaching. She was creative in integrating Kahoot games to facilitate her teaching and to increases students' motivation and their understanding of the lessons. She used language learning websites, amusing YouTube video clips, iTunes U course as

a supplementary tool to facilitate her class. It seems that she used the same tools for both work and fun.

She thought technology saved her time in class preparation and helped learning nowadays be easier and more accessible. She believed students could improve English by practicing using online digital technological recourses. However, she underestimated the students' digital technology use for learning.

Although Bee experienced many barriers, she was motivated to integrate an online writing game, iBooks, and iPads into her teaching in the future after she was ready and had acquired more technology skills. She supported having a technology mentor for receiving good techniques and assistance about using technology from an expert. She was also interested in designing YouTube videos and digital storytelling projects to develop her digital literacy skills.

According to the interview findings, Bee was interested in learning to use new technology from YouTube videos. She said, "I think nowadays it is easy to find the ways to learn to use technology. The importance is you must know first what digital apps that are good. And nowadays we just learn by trials". She planned to create iBooks and use various online games to motivate students and help them understand the lessons faster and better and practice writing English vocabulary. Based on all findings, Bee is the "thoughtful player" for her teaching team and students. She is open-minded and ready for following rules, making changes, and helping students to achieve their learning goals.

Importantly, Bee's case study may inform teachers in this digital age to become more open-mined and adaptable in applying new digital technology to create more fun and meaningful learning and teaching practices. Teachers should listen to the students' voices for their utmost learning development. In addition, because Bee is confident in her lesson planning with

technology affordance, she can also play a mentoring role to help her colleagues design and integrate Kahoot games in the class content.

The next findings and interpretation will focus on the results of Sam. He is a respectful, experienced American teacher admired by many UTCC students.

5.2 Sam – "The Cautious Facilitator"

Sam is called the "cautious facilitator" because he is a careful technology user and looks at his teaching role as a facilitator in the class. Sam was very cautious about his postings on Facebook and cared about showing his appreciation to other Facebook friends' posts.

Sam's data on the teacher survey, his digital literacy report, two interview sessions, and two class observations were analyzed to discuss the seven following sub-sections in detail.

5.2.1 Sam's background information

5.2.2 Sam's digital technology use for academic and non-academic purposes

5.2.3 Sam's perceptions of students' digital technology use

5.2.4 Sam's perceptions of technology integration into curricula

5.2.5 Sam's technology application into curricula

5.2.6 Sam's evaluation of digital web 2.0 technology-enhanced activities

5.2.7 A summary of Sam's findings and interpretations

First, I will present Sam's personal, educational, and work background as it is useful to better understand his identity and my interpretation.

5.2.1 Sam's Background Information

Sam (a pseudonym) is a 52-year-old American, married with a well-educated Thai woman, and has two bilingual kids. He has lived in Thailand about 15 years and taught English for 26

years. Thus, he can understand Thai conversations. His Master's degree in Classical Languages proves his interest in languages and literacies.

Sam began working at UTCC in 2014 and has applied iTunes U course management and iPads into language teaching for four years. Incredibly, Sam spent 15 hours a week teaching five different subjects: English from Media, Introduction to the Study of English Literature, English for Public Relations, Western Mythology and English for Communication 4.

Sam is an understanding teacher, helpful colleague, careful facilitator, compromising leader and obedient follower from my observation in our 10-year-long friendship. He actively likes to support students' needs in learning. Based on his students' perceptions, he is a model teacher, who is thoughtful and patient with his friendly characteristics. From my class observations, I noticed that Sam and Bee both treated students with understanding and respect.

5.2.2 Sam's Digital Technology Use for Academic and Non-academic Purposes: Mainly use websites and Facebook

The survey results of Sam's digital technology use will answer the first research question, "what new digital technologies do in-service teachers and students use for academic and non-academic purposes?" In this section, I will describe Sam's results in two sub-sections followed by my interpretation.

5.2.2.1 Sam's digital technology use for academic purposes

5.2.2.2 Sam's digital technology use for non-academic purposes

5.2.2.1 Sam's Digital Technology Use for Academic Purposes: Used mainly websites, iTunes U courses, Facebook, and YouTube videos

In this sub-section, I will present Sam's survey findings for his digital technology use for academic purposes in Table 5.2.1 followed by my interpretation.

Table 5.2.1 Sam's digital technology use for academic purposes (teacher survey, item 7)

Technology use for academic purposes	Sam	Technology use for academic purposes	Sam
Websites	5	Social network sites for language learning	2
iTunes U courses	5	Blogs	2
Facebook	5	Twitter	2
YouTube	5	Games	2
iPads	4	Instagram	1
Wikis	4	Skype	1
Emails	4	Pinterest	1
LINE	4	Clickers	1
Mobile apps	3	**Mean**	**3**

The teacher survey results in Table 5.2.1 reveal that Sam's score for his technology use for academic purposes (3) was a little high. He always uploaded links and presentation slides to iTunes U courses (5) and searched for authentic teaching resources on websites (5) and YouTube (5).

Interestingly, Sam also gave a high score in using Facebook (5) to communicate with students regarding submitting assignment links, and informing useful notices about the class. he said he used Facebook as it was popular among the students and to keep connection with his students. In fact, he restated that he would not use Facebook if his students stopped using it. I may assume that Sam was sociable with students, approachable, and positive with the benefits of social media. Through Facebook communication with students, Sam has developed good rapport and high respect from his students based on the student focus group discussion.

Sam reported that he usually used emails (4) and LINE (4) for contacting English and Translation (E&T) faculty members about departmental administration. He additionally gave a high rating (4) for his iPad use in teaching. He always encouraged students to use iPads for their presentation on Airplay mode, access his materials online, or search for websites in the class.

Based on his interview results, he would choose the technological tools that he was comfortable with and confident in using.

From my observation, he was not a risk-taking person in relation to experimenting with new technology and not technology savvy. Sam was not interested in learning to use new digital technologies and social media. He explained that social media was just "a tool", so he was not motivated in learning new technology as long as he could keep in touch with his students on Facebook. However, he followed trends of digital technologies, and was willing to adopt the iHybrid teaching and learning system of the university.

In summary, Sam believed in his teaching philosophy, but he would be open-minded to integrate new digital learning tools if they were easy to use, applicable, and aligned with his pedagogical purposes. Sam often used YouTube videos, iTunes U courses, websites and Facebook for teaching.

5.2.2.2 Sam's Digital Technology Use for Non-academic Purposes: Interested in using websites, mobile apps, emails, Facebook, and YouTube

In this sub-section, I will present Sam's survey findings about his digital technology use for non-academic purposes in Table 5.2.2 followed by my interpretation.

Table 5.2.2 Sam's digital technology use for non-academic purposes (teacher survey, item 10)

Technology use for non-academic purposes	Sam	Technology use for non-academic purposes	Sam
Websites	5	Twitter	3
Mobile apps	5	Blogs	2
Emails	5	Skype	2
Facebook	5	Games	2
YouTube	5	iTunes U courses	1
iPads	4	Instagram	1
Wikis	4	Pinterest	1
LINE	4	**Mean**	**3.27**

The teacher survey results in Table 5.2.2 show that Sam's score for his digital technology use for non-academic purposes (3.27) was high. He rated very high the use of Facebook (5), websites (5), emails (5), mobile apps (5), and YouTube videos (5). But, Sam rated a very low score for Instagram (1), Pinterest (1), and iTunes U course (1). He said that he was aware that Instagram was very popular among younger generation, but he did not have time to explore its potential. He said he got used to his Blackberry phone with key buttons that he has used for over 10 years and he stressed, "I am not a type of person to get any types of new technology." This may be because Sam never took technological courses, which may cause him to be not very confident learning to use new digital tools. The teacher survey results in the question item 16 reveal that Sam rated his low confidence in designing innovative teaching resources and materials with technologies.

However, Sam believed he had sufficient skills and knowledge of technology. He was confident in using websites and Facebook, and developing his technology skills by doing. This may be because he had attended several ICT training sessions. Sam may think websites, YouTube, and Facebook that he has always used were sufficient and appropriate. This can be supported by his high rate for his comfort with digital technology use for teaching and for fun.

In summary, Sam always used YouTube, emails, and mobile apps. He likes reading online news on Facebook. Although he did not use Instagram like his students, he often participated in some digital communities, such as Wikis and LINE. This indicates he was aware of potential of social media and web 2.0 technologies, but he did not have time to learn to use them.

In the next section, I will describe Sam's opinions about his students' digital technology use for academic and non-academic purposes.

5.2.3 Sam's Perceptions of Students' Digital Technology Use: Highly overestimated the use for learning and very close estimation for pleasure

To understand better why Sam selected Facebook, websites and YouTube videos for his pedagogical practices, it is essential to explore his perceptions of students' digital technology use for academic and non-academic purposes. The following findings of Sam from the teacher survey and interviews will answer the second research question, "what are in-service teachers' perceptions of how students use digital technologies for academic and non-academic purposes?" In this section, I will describe Sam's results for two sub-sections followed by my interpretation.

5.2.3.1 Sam's perceptions of students' digital technology use for academic purposes

5.2.3.2 Sam's perceptions of students' digital technology use for non-academic purposes

5.2.3.1 Sam's Perceptions of Students' Digital Technology Use for Academic Purposes: Highly overestimated the students' use of Facebook and Pinterest

Table 5.2.3 below presents Sam's assumptions about students' digital technology use for academic purposes. I will describe his results from the teacher survey item 13 followed by my interpretation.

Table 5.2.3 Sam's perceptions of students' digital technology use for academic purposes (teacher survey, item13)

Technology use for academic purposes	Sam's perceptions	Students (*n* = 58)	Sam-Students
a) YouTube	5	4.10	0.90
b) Facebook	5	3.33	1.67
c) Websites	4	3.66	0.34
d) iPads	4	3.60	0.40
e) iTunes U courses	4	3.84	1.16
f) Mobile apps (e.g., online dictionary)	4	4.05	-0.05
g) Social network sites for language learning	4	3.04	0.96
h) Instagram	4	2.88	1.12
i) LINE	4	2.81	1.19
j) Games	4	2.95	1.05
k) Pinterest	4	2.38	1.62
l) Emails	3	2.43	0.57
m) Twitter	3	2.78	0.22
n) Blogs	2	2.48	-0.48
o) Skype	2	1.74	0.26
p) Wikis	2	2.62	-0.62
Mean	**3.69**	**3.04**	**0.65**

The teacher and student survey results in Table 5.2.3 illustrate that Sam overrated his students' digital technology use for academic purposes for almost all technology types (0.65). Sam's highest overestimation for students' technology use were Facebook (1.67) and Pinterest (1.62).

Referring to the results in the table, Sam weighed the students' highest use on YouTube (5) that it was quite aligned with the students' technology use because they used YouTube (Ss = 4.10) the most often. Regarding students' Facebook use (Ss = 3.33), Sam mistakenly overestimated its use as the highest (5). This suggests that his high rate on Facebook may result from his regular use of Facebook Messenger to communicate with his students outside the class. However, Sam was right that students used Facebook (Ss = 3.33) more often than LINE (Ss = 2.81) for academic purposes. Sam may be aware that nowadays there have been increasing use of Facebook pages of each school in the university.

But Sam underestimated the students' use of three technology types: Wikis (-0.62), blogs (-0.48), and mobile apps (-0.05). This may be because he seldom ever explored the benefits of these web 2.0 technologies, so he did not realize their viability as much as his students.

In summary, Sam highly overestimated his students' digital technology use for academic purposes. This implies that Sam assumed nowadays students were very engaged with digital tools and social media communities. This may reflect Sam's optimism and value for equality that he respects his students as being autonomous learners who use technology to develop English learning skills.

The next findings will focus on Sam's perceptions of his students' digital technology use for non-academic purposes.

5.2.3.2 Sam's Perceptions of Students' Digital Technology Use for Non-academic Purposes: Understood students' technology use

Table 5.2.4 below illustrates Sam's assumptions about students' digital technology use for non-academic purposes. I will describe Sam's results from the survey item 14 followed by my interpretation.

Table 5.2.4 Sam's perceptions of students' digital technology use for non-academic purposes (teacher survey, item 14)

Technology use for non-academic purposes	Sam's perceptions	Students (*n* = 58)	Sam - Students
a) Instagram	5	3.91	1.09
b) LINE	5	4.37	0.63
c) Facebook	5	4.21	0.79
d) Games	5	4.02	0.98
e) YouTube	5	4.70	0.30
f) Websites	4	4.86	-0.86
g) Mobile apps	4	4.47	-0.47
h) Pinterest	3	2.48	0.52
i) iTunes U courses	2	2.74	-0.74
j) Wikis	2	2.52	-0.52
k) Blogs	2	2.60	-0.60
l) Twitter	2	3.47	-1.47
m) Skype	2	1.63	0.37
n) Emails	2	2.16	-0.16
Mean	**3.47**	**3.44**	**0.03**

The survey results in Table 5.2.4 illustrate that Sam's perceptions of students' use of digital technology for non-academic purposes (3.47) were impressively very close to students' technology use (Ss = 3.44). This implies that he cared and knew what students were doing with technology outside the class.

This finding could support my interpretation that he is a caring, cautious, and understanding teacher. I also think Sam reasonably weighed each technology tool and quite knew his students' lifestyle. This shows he has developed a good connection with the students outside the class through Facebook.

The findings in the table also reveal that Sam overestimated the students' use of Instagram (1.09), games (0.98), and Facebook (0.79). He said he was aware that students are more fascinated with Instagram and Snapchat, but they often used Facebook. Accordingly, Sam thought Facebook was still "extremely convenient" and quicker to "reach students" than sending emails. However, he noticed that some students did not show high interest to be his Facebook

friends like in the past. He assumed that students might have too many Facebook friends. In addition, being friends with him might be unnecessary as they study with him only once a week. This may imply that at present students may prefer not to socialize with teachers on social media and want to keep their privacy. Sam reported he needed to contact students through their emails. But Sam was worried because he knew many students did not check emails as regularly as Facebook messages.

Based on the survey findings in the above table, Sam substantially underestimated the students' use of Twitter (-1.47). This suggests he was not aware that students often used Twitter, perhaps because he did not find the enjoyment of the potential of Twitter unlike his students.

In summary, Sam's perceptions of students' digital technology use for non-academic purposes were impressively close to students' use. For example, Sam was aware that students were now using Instagram more, although he did not use them. This indicates Sam's good characteristics as a caring and understanding teacher who knows students' needs and their lifestyle of technology use.

In the next section, I will present Sam's results from the teacher survey and his interviews for his perceptions of technology integration into curricula followed by my interpretation.

5.2.4 Sam's Perceptions of Technology Integration into Curricula

The teacher survey and interview findings of Sam will answer the third research question, "what are in-service teachers' and students' perceptions of technology integration into curricula?" In this section, I will divide Sam's results into three sub-sections followed by my interpretation.

5.2.4.1 Sam's perceptions of technology integration into his teaching

5.2.4.2 Sam's perceptions of different barriers to integrate technology into curricula

5.2.4.3 Sam's satisfaction with the university's policies about technology

5.2.4.1 Sam's Perceptions of Technology Integration into His Teaching: Technology was just an added-on tool but essential for today's teaching

Sam recognized the potential of classic technology for his teaching as he said, "Technology is the essential part of the tools of the class". His PowerPoint slides were his teaching tool for sharing information important for tests, and he uploaded them onto the iTunes U course as "material storage … one place stop for everything for the course". Besides iTunes U, technologies, such as emails and a "classic" thumb drive, helped him archive documents and teaching materials in a chronological order. For Sam, technology was also useful for saving paper and money on texts.

Based on the conversations with Sam, he thought digital technology was "generational". Thus, he had no excitement to try out any new technologies. The main reason for Sam to select technology in teaching was "the widest use and familiarity". For example, he still uses a Blackberry phone and thumb drives because he is familiar with these tools. He used some basic functions of technology, such as using iPad to take a screen shot and send the picture to students, and using MS Word and Track Changes functions to give feedback to students.

Moreover, he found that Facebook made it hard to resist a prompt response to his students on Facebook even though students texted him at night. He said he was always available and revealed that this was both advantageous and disadvantageous.

In summary, technology became an effective tool for Sam's in-class and out-of-class teaching. Based on my observation and interview results, Sam knew many types of digital technology, but he has not yet optimized them to promote students' digital literacies. His priority

was to cover the course objectives, and he used only "necessary" tools and did not want anything to "interfere" in his normal work routines.

5.2.4.2 Sam's Perceptions of Different Barriers to Integrate Technology into Curricula: Not had many barriers but worry about a little time for class preparation

This sub-section will describe Sam's perceptions of different barriers that hinder him from integrating technology into curricula.

Table 5.2.5 Sam's perceptions of different barriers to integrate technology into curricula (teacher survey, item 17)
The scale ranges from a very high barrier (1) to a very low barrier (5)

Different barriers to integrate technology into curricula	Sam	Different barriers to integrate technology into curricula	Sam
Personal motivation	4	Technological training and support	3
Collaboration with other teachers	4	Technology and Internet access	3
University infrastructures and facilities	4	Classroom management	3
Budgeting for new technologies (apps)	4	Technical problems in the classroom	3
Assessment aligned with technology use	4	Teaching methods and styles	3
Institutional policies and administration	4	Teaching loads and responsibilities	3
Subject content	4	English proficiency of students	3
Technological skills of my own	4	Learning styles of students	3
Technological skills of students	4	Time for teaching preparation	2
Motivation of students	4	**Mean**	**3.47**

The teacher survey results in Table 5.2.5 show that Sam's average score for this item was 3.47. This indicates he did not think he faced many barriers that might hinder him from integrating technology. He felt more comfortable with technology integration. He had no problems with the technological policies of the university (4), and he was motivated in using technology (4) and working collaboratively with other faculty members (4). He was also confident in his technological skills (4) and his students' technological competence (4) in incorporating technology into class.

Based on the findings above, the most prominent obstacle for Sam was time for class preparation (2). This may be because he taught five courses. He emphasized that he did not

integrate new digital technology in his teaching because he focused on "the content of the medium, not the medium itself". He also raised an issue that "sometimes we over rely on the tools themselves, than as tools to achieve a goal and purpose".

This suggests why Sam remained a thumb drive person who has not yet implemented innovative learning activities with web 2.0 technologies. He concluded the interview by saying, "I don't want to spend too much time having to learn, a steep learning curve with a new program to use it in the class. I want something that I use quickly and be able to employ it based on the platform I am familiar with".

In summary, Sam is positive with the concept of technology integration and has not had many big obstacles, but due to the limited time for teaching preparation, he did not integrate collaborative technology-infused learning activities.

In the next section, I will present Sam's survey results for his satisfaction with the university's policies in relation to technology application into teaching and learning.

5.2.4.3 Sam's Satisfaction with the University's Policies about Technology: Mostly satisfied except iPad-based testing

In this sub-section, I will describe Sam's survey findings for item 19 followed by my interpretation.

Table 5.2.6 Sam's satisfaction with the university's policies about technology (teacher survey, item19)

The university's policies about technology	Sam
a) Creating iTunes U courses.	5
b) Encouraging the use of iPads and other technologies.	5
c) The university's technological support and training.	4
d) The university's technological infrastructure.	4
e) Increasing technology integration.	4
f) Taking online exams on iPads.	3
Mean	**4.17**

According to the teacher survey results in Table 5.2.6, Sam rated a high satisfaction level with the university's policies (4.17). This indicates that he was open-minded with technology integration. Sam was most satisfied with creating iTunes U courses (5) and the use of iPads (5). He said it was convenient for students to get access to his teaching materials stored on his iTunes U course anytime.

However, Sam was concerned with a power outage that sometimes happens at the university, which made him waste time with restarting the computer. He said, without data back-up, there will be "zero productivity". This remark was reasserted by Sam's lower satisfaction score with the university technological infrastructure (4) and its policy about iPad-based test-taking (3) presented in the above table.

In summary, Sam was very satisfied with the institutional policies about using iTunes U course and iPads, but he felt indifferent towards taking exams on iPads.

In the next section, based on my class observation and Sam's interview transcription, I will illustrate how Sam conducted his class and applied technologies into curricula according to his digital technology use and his perceptions of students' digital technology use for academic purposes.

5.2.5 Sam's Technology Application into Curricula

This section focuses on Sam's technology application into curricula. It is helpful and essential to investigate how he applied technology in his English from Media class followed by my interpretation. His data derived from two class observations and two interviews and were interpreted to answer the fourth research question, "how do in-service teachers' perceptions of how they and students use technology inside and outside of the classroom impact how they apply technology to their pedagogical practices?"

In an academic environment, Sam was a conformer and conservative in using technology tools. He played it safe, followed the rules, cared for students' feelings, and always listened to their opinions. For his pedagogical methods and styles, he was a "cautious facilitator", who had firm beliefs about his own rules to choose social media tools and technologies mostly based on his familiarity and students' technology use. I found he employed the teaching strategy "routine" he felt accustomed to. However, he was liberal and open to listen to students' comments and quite responsive to their needs.

Sam mainly used different media, such as websites, online news articles, songs and movies on YouTube in his English from Media course. He searched for websites and YouTube videos to show images and used them as supplementary resources for students to gain better understanding about the course content. He said, "I try to engage them in the class. I try to mix-up activity to make it interesting. I try to use more games as much as possible. I learn their names".

He delivered his teaching in a classic way with PowerPoint slides pulled from his thumb drive, a whiteboard, and a desktop computer. He normally converted his PowerPoint slides to PDF for reference and ideas-sharing with students and then uploaded them onto iTunes U for study and for exam preparation. The iTunes U courses for Sam were merely storage places of materials that students could access. He put all information that would be tested on quizzes or exams on the slides as he said he hated a mystery, so there would be no surprises. This indicates that Sam is not adventurous about emerging technologies because they are time-consuming to learn and to take control of them to use confidently for teaching.

Sam used Facebook as only a medium to communicate with students and submit the links of assignments to students via Messenger. He was also always welcome to be a "Facebook friend" with his students. This is the reason why Sam rated high on Facebook for using it for academic

purposes. He received all emails and contact with students on Facebook Messenger on his phone. He did not use LINE like other colleagues for communication with students because his Blackberry phone does not have this app. This suggests that an up-to-date smartphone is a powerful determining factor in the wide use of social media and digital technologies for users.

Sam reported that he occasionally brought his iPad to the class as it was a "convenient" tool to show pictures and make a presentation easier in the Airplay mode that allows students to remain sitting in their seats. Sam particularly liked the way students remain seated to make it more like "discussion" and bring "equality" to the class. He emphasized that the concept of equality was very important, as he did not want to look "too dominating" because of his tall height. Based on my direct experience at the university and observation, Sam's teaching philosophy may be different from that applied in many normal classes in Thailand. Students must yield to the authority of teachers and mostly are treated inferior to their teacher.

According to Sam's students, Sam was the "perfect" teacher, who was patient, thoughtful, and supportive to find ways to engage students in studying in the class. They felt very positive about Sam's teaching style and technological skills. The students said they realized that Sam might not be good at many modern digital technologies, but he was good at using technologies he selected to facilitate learning and enhance their understanding of the content of the subject. For example, Sam was skillful in using the Google search engine to look for information to teach the class. He was more competent in computer skills than many other teachers. Sam also knew that he was respectable and admired by students and felt proud that this made him distinct from other Thai teachers. I think Sam means that Thai teachers tend to be too serious, strict, and less understanding.

In summary, Sam used PowerPoint slides, websites, and online resources as teaching materials which were uploaded to iTunes U courses. He also contacted students through Facebook Messenger to send quick messages about the class management. He occasionally used iPads in the class to make a presentation via Airplay mode. He was a supportive and patient teacher and his lecturing style was informative, critical, and easy to follow, so students liked to take class with him. However, due to the time limitation of class preparation, he has not yet implemented engaging or collaborative technology-enhanced language learning and teaching activities in the class.

The next section will focus on Sam's survey results for his evaluation of the usefulness and viabilities of various digital technological resources followed by my interpretation.

5.2.6 Sam's Evaluation of Digital Web 2.0 Technology-enhanced Activities in Improving Digital Literacy Skills: Preferred to create a Facebook page and have a technology support group on LINE

In this section I will present Sam's survey and interview results followed by my interpretation to answer the fifth research question, "how do in-service teachers evaluate the usefulness and viability of various digital technological resources?" The results will inform teacher educators and trainers about Sam's perspectives of the effectiveness of each digital resource. Accordingly, the findings will be useful to have grounded notions to design appropriate TELLT activities to improve teachers' digital literacies.

Table 5.2.7 Sam's evaluation of Digital Web 2.0 Technology-enhanced Activities (teacher survey, item 20)

Digital Web 2.0 Technology-enhanced Activities	Sam
a) Creating a Facebook page for teachers	5
b) Creating a LINE group to discuss technology use	5
c) Creating a YouTube video project	4
d) Creating a digital storytelling project	4
e) Creating a Twitter	4
f) Having a technology mentor / tutor	3
g) Creating a teacher website	3
h) Creating an E-teaching portfolio	2
i) Creating a teacher blog	2
Mean	**3.33**

The teacher survey results in Table 5.2.7 show that Sam's average score for evaluation of digital web 2.0 technology-enhanced activities was 3.33. Sam was most interested in creating a Facebook page (5) and a LINE group (5) for information exchange about technology.

According to the interview findings, he advocated the use of Facebook. He said it was quicker to send a message and communicate with people on Facebook. As it can be seen from the previous results, Sam was more oriented towards self-regulated learning, so his response was different from Bee's and Ning's, who most preferred a technological mentor for learning to use technology (B = 5, N = 5). In contrast, Sam did not think it was very necessary to have a technology mentor based on his average rate (S = 3). He believed that digital literacy was improved by his own regular practice. Rather, Sam said he wanted to learn to use technology by himself. Because he considered himself as a facilitator, he reported that he was willing to help others with technological problems.

More importantly, he stressed that "time is a big issue" and normally he did not have time to write or learn new technology tools. This may be because he must look after his two kids most of the time, and he taught 15 hours a week with at least 3-4 courses a semester. After all, Sam

concluded that it was important to "keep practicing its use and be willing to learn new things, and be sure to follow up with current student preference". This indicates he is flexible and compromising that this seems to be a unique characteristic of Sam that may contribute to become a good digitally literate teacher.

In summary, Sam wanted to have a technology group for teachers on Facebook or LINE to discuss technology issues and share knowledge. He was also interested in creating a YouTube video projects and digital stories to improve his digital literacy.

5.2.7 A Summary of Sam's Findings and Interpretations

Based on the overall findings, Sam is an understanding and thoughtful teacher and cautious facilitator. Students' needs and satisfaction were the keys for him to select teaching tools and technologies for his pedagogy. He used Facebook because students used it. He mainly used websites, YouTube movies, songs, and iTunes U courses to deliver his teaching and used the same tools in his free time except iTunes U course. He sometimes used mobile apps and Twitter but never tried Instagram.

Sam participated in social media more than Bee and Ning. He considered technology as a medium for communication and teaching. He was mostly satisfied with the university's policies and was positive towards integrating digital technologies into curricula because technology was convenient and useful for accessing online teaching resources. But he was not very confident in creative innovative teaching materials. Time for teaching preparation was the big barrier that impeded him from integrating new technology-enhanced learning activities for students' active learning as he usually taught five classes.

The most outstanding result was that Sam's perceptions of students' technology use were rather similar to students' use for non-academic purposes, which shows his good relationship and

rapport with the students. As a result, based on students' comments, he was a good role model of being a teacher.

Sam preferred to create Facebook or LINE groups for teachers to develop digital literacy. He was also interested in creating YouTube videos and digital stories. In brief, I believe Sam is a "cautious facilitator" for technological practices and a caring, understanding teacher for the UTCC students.

The next section will focus on Ning's detailed profile. Ning appears to be more enthusiastic and determined than Bee and Sam to become a digitally literate teacher and an Apple Professional Development (APD) teacher trainer.

5.3 Ning – "The Rigorous Trainer"

Ning was given the title "the rigorous trainer" because she is a dedicated teacher and technology trainer of the Center for Teaching Excellence of the university. She showcased outstanding iPad-enhanced language teaching and learning, and her awareness of digital literacy training for students was invaluable. Similarly to those of Bee and Sam, I will present Ning's results collected from a digital literacy report, two teacher surveys, two interview sessions and two class observations. Her results will comprise seven sub-sections as follows:

5.3.1 Ning's background information

5.3.2 Ning's digital technology use for academic and non-academic purposes

5.3.3 Ning's perceptions of students' digital technology use

5.3.4 Ning's perceptions of technology integration into curricula

5.3.5 Ning's technology application into curricula

5.3.6 Ning's evaluation on digital web 2.0 technology-enhanced activities in improving digital literacy skills

5.3.7 A summary of Ning's findings and interpretations

Prior to describing Ning's results and my interpretation in a topic sequence, Ning's background information is helpful to understand her perceptions about subsequent issues.

5.3.1 Ning's Background Information

Ning at the age of 54 is a calm, serious, helpful, contemplative English language teacher, who has had 17 years of teaching experience at UTCC. She used to work with the tourist police at the Tourism Authority of Thailand (TAT) as a translator before she received her MA in Translation at Mahidol University, one of the best renowned research universities in Thailand. Her educational background in Translation helps explain her characteristics as a reserved, quiet reader and independent thinker.

Ning is calm and skillful in using mobile apps. But, at the same time she acts as a directive teacher and serious trainer who may look like a "luddite". She is demanding when she gets students to follow her classroom arrangement, this can create good and bad effects for students' motivation and their learning development.

She is unique and outstanding in terms of taking responsibilities and working under pressure. She is confident and risk-taking in trying new learning and teaching activities with technology affordance. She always searches for new teaching apps and attends technological workshops offered by the university. In the meantime, she is also a technology mentor for her colleagues and willing to give a presentation and share her expertise in using a number of classroom apps and introducing a flipped classroom approach that she has adopted in her teaching. As a result, Ning was awarded as "The Best of the Best" and "Teaching Excellence" for the year 2017 by the university.

5.3.2 Ning's Digital Technology Use for Academic and Non-academic Purposes: Mainly websites, iPads, iTunes U and mobile apps

As this study's purpose is to assess teachers' digital literacies, it is appropriate to explore in detail Ning's digital technology use to answer the first research question, "what new digital technologies do in-service teachers and students use for academic and non-academic purposes?" In this section, I will present the findings of Ning from the teacher survey for two sub-sections followed by my interpretation as follows:

5.3.2.1 Ning's digital technology use for academic purposes

5.3.2.2 Ning's digital technology use for non-academic purposes

5.3.2.1 Ning's Digital Technology Use for Academic Purposes: Used iPad, iTunes U courses, and Nearpod app

In this sub-section, I will describe Ning's survey findings about her digital technology use for academic purposes in Table 5.3.1 followed by my interpretation.

Table 5.3.1 Ning's digital technology use for academic purposes (teacher survey, item 7)

Technology use for academic purposes	Ning	Technology use for academic purposes	Ning
Websites	5	Social network sites for language learning	1
iPads	5	Blogs	1
iTunes U courses	5	Twitter	1
Mobile apps	5	Instagram	1
Facebook	3	Skype	1
YouTube	3	LINE	1
Wikis	2	Games	1
Emails	2	Pinterest	1
Clickers	2	**Mean**	**2.35**

Based on the teacher survey results in Table 5.3.1, it is interesting that Ning's average score of digital technology use for academic purposes (2.35) was quite surprisingly low in spite of the fact that she is a technology teacher trainer of the university.

The results in the table above show that Ning never used eight types of digital technologies: social network sites for language learning (1), blogs (1), Twitter (1), Instagram (1), Skype (1), LINE (1), online games (1), or Pinterest (1) for teaching English. These results can be understood because Ning said she was not interested in using social media. In addition, she preferred experimenting with mobile apps which may already consume her whole time. Alternatively, she was quite introverted and did not feel comfortable exposing herself in the social media.

The only social media Ning sometimes used was Facebook (3) as a requirement from the Center for Teaching Excellence that Ning as one of the members of the center need a Facebook page to update teaching innovations. Ning must keep her Facebook page active by posting course information, but Facebook was not integrated as a teaching and learning tool in the class.

On the other hand, Ning always used websites (5), iPads (5), iTunes U (5), and mobile apps (5) in her class. Regarding the use of iTunes U, all three participants, Bee, Sam and Ning, rated it very high (5) as an iTunes U course is a mandatory teaching tool for the UTCC faculty at present. Accordingly, she expected her students to be vigilant and active to check their assignment on the iTunes U course, finish it, and submit work through the iTunes U system by a deadline on Mondays at 8 a.m.

Ning also shows her high frequency use of mobile apps for teaching (5). Ning reported during the interviews that she liked to spend most of her time on her iPad (5) checking students' assignments on the iTunes U platform (5), and preparing lessons in the classroom apps (5), such as Nearpod. Based on the interview findings, Ning was highly engaged with using technologies for teaching, and she was comfortable to learn technologies by herself. Ning had high motivation

and successful experience in teaching with mobile apps and iPads. She is confident in her technological skills and willing to learn about new technology use.

In summary, Ning always used mobile apps, iTunes U courses, and websites in her classroom. More importantly, she fully adopted an iPad-enhanced language learning and teaching approach. However, she did not fond of using social media at all.

5.3.2.2 Ning's Digital Technology Use for Non-academic Purposes: Used only Facebook and LINE

In this sub-section, I will describe Ning's survey findings about her digital technology use for non-academic purposes in Table 5.3.2 followed by my interpretation.

Table 5.3.2 Ning's digital technology use for non-academic purposes (teacher survey, item 10)

Technology use for non-academic purposes	Ning	Technology use for non-academic purposes	Ning
iPads	5	YouTube	2
Emails	5	iTunes U courses	1
LINE	5	Wikis	1
Facebook	5	Blogs	1
Websites	4	Skype	1
Mobile apps	3	Games	1
Twitter	2	Pinterest	1
Instagram	2	**Mean**	**2.60**

Referring to the teacher survey findings in Table 5.3.2, Ning's interest in using technology for non-academic purposes (2.60) was the lowest in comparison to Bee (2.80) and Sam (3.27). It can be seen from the table that Ning's low average score resulted from her very low rate on Wikis (1), blogs (1), Skype (1), Pinterest (1), and games (1).

Based on the interview findings, Ning said it was a waste of her time in playing online games, writing blogs, and chatting on LINE for pleasure. She reported in the interview that she did not like LINE as she was disturbed by several popped messages, but she found her pleasure in reading the newsfeed on Facebook. She said during the interview that she spent most of her time

searching online information, designing learning activities on iTunes U course, and checking students' homework on iTunes U courses. However, her statements were opposed to her high self-rate score for LINE (5) in the table above.

This implies that she did not get much fun in using social media, but she may have good reasons to keep using them. I assumed she needed to monitor LINE messages as it was related to administrative work in the department, such as meeting job deadlines and attending teacher meetings.

In summary, Ning always used Facebook (5), LINE (5), emails (5), and iPads (5) in her free time. It seems that due to her entire dedication to design technology-enhanced teaching and learning materials on iTunes U course and mobile apps, Ning had no time to socialize in social media.

In the next section, I will describe Ning's perceptions of her students' digital technology use for academic and non-academic purposes.

5.3.3 Ning's Perceptions of Students' Digital Technology Use: Underestimated the technology use for both academic and non-academic purposes

The teacher survey and Ning's interview findings will be analyzed to answer the second research question, "what are in-service teachers' perceptions of how students use technologies for academic and non-academic purposes?" To have better understanding about Ning's digital technology application for teaching, it is necessary to investigate her assumptions about students' digital technology use for academic and non-academic purposes.

In this section, I will demonstrate Ning's results from the teacher survey and her interviews in two sub-sections followed by my interpretation.

5.3.3.1 Ning's perceptions of students' digital technology use for academic purposes

5.3.3.2 Ning's perceptions of students' digital technology use for non-academic purposes

5.3.3.1 Ning's Perceptions of Students' Digital Technology Use for Academic Purposes: Greatly underestimated the students' technology use for all types especially Facebook and YouTube

Table 5.3.4 below presents Ning's perceptions about students' digital technology use for academic purposes. Ning's results from the survey item 13 are followed by my interpretation.

Table 5.3.3 Ning's perceptions of students' digital technology use for academic purposes (teacher survey, item13)

Technology use for academic purposes	Ning's perceptions	Students (*n* = 58)	Ning - Students
a) Websites	3	3.66	-0.66
b) iPads	3	3.60	-0.60
c) iTunes U courses	3	3.84	-0.84
d) Mobile apps (e.g., online dictionary)	3	4.05	-1.05
e) Social network sites for language learning	2	3.04	-1.04
f) YouTube	2	4.10	-2.10
g) Wikis	1	2.62	-1.62
h) Blogs	1	2.48	-1.48
i) Emails	1	2.43	-1.43
j) Twitter	1	2.78	-1.78
k) Instagram	1	2.88	-1.88
l) Skype	1	1.74	-0.74
m) LINE	1	2.81	-1.81
n) Facebook	1	3.33	-2.33
o) Games	1	2.95	-1.95
p) Pinterest	1	2.38	-1.38
Mean	**1.63**	**3.04**	**-1.41**

The results in Table 5.3.3 show that Ning significantly underestimated the students' use of technology for academic purposes (-1.41) for all 16 types of digital tools, especially the students' use of Facebook (-2.33), YouTube (-2.10), and online games (-1.95).

Ning predicted that the students never used 10 social media such as Twitter, Facebook, and Instagram in learning English. This indicates that Ning did not know what and how her students used technology for academic purposes. Rather, the students used all 16 digital tools. According

to the interview findings, Ning did not like to use social media, so she may not use them to socialize with students outside the class as often as Sam. Therefore, Ning did not know her students' learning styles. Ning did not expect that the students would be very interested and motivated in using digital technologies to facilitate their learning and develop their English skills and proficiencies.

In summary, Ning highly underestimated the students' digital technology use for all 16 types for academic purposes. Crucially, she did not realize the students' broad use of social media tools for English learning development.

The following findings of Ning focus on her perceptions of students' digital technology use for non-academic purposes.

5.3.3.2 Ning's Perceptions of Students' Digital Technology Use for Non-academic Purposes: Underestimated students' use of websites and iTunes U courses the most

I will present Ning's results about her perceptions of students' digital technology use for non-academic purposes from the survey item 14 followed by my interpretation.

Table 5.3.4 Ning' perceptions of students' digital technology use for non-academic purposes (teacher survey, item 14)

Technology use for non-academic purposes	Ning's perceptions	Students (*n* = 58)	Ning - Students
a) Games	5	4.02	0.98
b) YouTube	5	4.70	0.30
c) Mobile apps	4	4.47	-0.47
d) Instagram	4	3.91	0.09
e) LINE	4	4.37	-0.37
f) Facebook	4	4.21	-0.21
g) Websites	3	4.86	-1.86
h) Twitter	2	3.47	-1.47
i) Skype	2	1.63	0.37
j) Pinterest	2	2.48	-0.48
k) iTunes U courses	1	2.74	-1.74
l) Wikis	1	2.52	-1.52
m) Blogs	1	2.60	-1.60
n) Emails	1	2.16	-1.16
Mean	**2.93**	**3.44**	**-0.65**

The teacher survey results in Table 5.3.4 reveal that Ning generally underestimated the students' digital technology use for non-academic purposes (-0.65). She underrated the students' technology use for 10 technology types. This indicates that Ning was not aware that students used a number of digital technologies and social media for their pleasure. It is interesting that these findings contradict Ning's interview that new students nowadays became more comfortable with using digital technologies.

The results in the table above illustrate that Ning thought her students never used Wikis (1), web blogs (1), and iTunes U (1) for non-academic purposes. Rather, the students used them occasionally based on their average scores for Wikis (Ss = 2.52), blogs (Ss = 2.60) and iTunes U (Ss = 2.79) that were much higher than Ning's perceptions.

This may cause Ning not to value the potential of technology use for pleasure as much as her students. Thus, it may affect her underestimation of students' digital technology use for non-

academic purposes. She acknowledged her lower skills in using technologies and social media for fun.

In summary, Ning underrated the students' technology use for non-academic purposes especially websites, iTunes U courses, and web blogs. This implies she did not know that her students extensively used a variety of digital technologies and social media in their free time. Therefore, this finding will give her and other teachers insight into to what extent her students were engaged with and enjoyed Instagram and Twitter; in turn, she may be motivated to integrate these into her pedagogy.

In the next section, I will present the survey and interview results of Ning for her perceptions of technology integration into curricula followed by my interpretation.

5.3.4 Ning's Perceptions of Technology Integration into Curricula: Passionate about using classroom apps for teaching

One of the major objectives of this study is to explore the in-service teachers' perceptions of incorporating digital technologies into pedagogical practices. Thus, it is essential to study in-depth how Ning thinks about technology integration for teaching.

As noticed, Ning is different from the majority of teachers, who look reluctant in using digital technologies in the class. She is active about exploring the potential use of mobile apps although she feels indifferent about social media. These findings from the teacher survey and Ning's interviews will answer the third research question, "what are in-service teachers' and students' perceptions of technology integration into curricula?"

In this section, I will present Ning's survey and interview results for three sub-sections followed by my interpretation.

5.3.4.1 Ning's perceptions of technology integration into her teaching

5.3.4.2 Ning's perceptions of different barriers to integrate technology into curricula

5.3.4.3 Ning's satisfaction with the university's policies about technology

5.3.4.1 Ning's Perceptions of Technology Integration into Her Teaching: Important tool and very positive about using digital technologies in the classroom

It is surprising that in the beginning Ning said she did not like technologies. This attitude, as has been pointed out, may sound very familiar among many other senior teachers in this study based on my direct observation. However, she took a risk and then changed her lecturing method to collaborative learning with iPad technology affordance. She said, "I am not good at technologies but I believe we can make a good change … otherwise we cannot understand and keep up with young students".

Ning had created 12 iTunes U courses so far, and she said because all teaching notes and presentation slides were neatly organized and uploaded to iTunes U course management. She stated that it would be easy, fast, and more manageable should she teach the same course again. She would just revise her course information and update teaching materials for a new semester. She emphasized that it was very necessary for today's teachers to integrate technology into teaching in the digital age to catch up with students' interests and expertise in technology usage as today students' learning style is changing to be autonomous learning.

Ning enjoyed using technology in her class because she realized its affordances to promote students' motivation in learning. She thought the content of her Translation course was "boring", so she started implementing new mobile apps in her class to create fun class activities, such as Showbie and Explain Everything. She felt her students had become more motivated in learning and they found using apps for learning easy, useful, and convenient.

She was certain that technology helped expand the students' English skills and knowledge of translation. She said students' good web searching skills were useful, which made learning and teaching more collaborative and engaging. She highlighted, "if we use it appropriately and purposefully, it will support learning very well". She also discovered that using technology offered great opportunities for students to learn English from native speakers.

Ning accepted, however, that using technology for teaching could be exhausting and time-consuming in searching for online sources, planning and preparing online lessons, and uploading them to iTunes U courses besides checking and evaluating many students' writing assignments. She said she dedicated her weekends to finding online teaching resources and carefully thought how to design her lessons in an iTunes U course.

In conclusion, Ning claimed technology gave her inspiration in improving her teaching style and course evaluation to make learning more fun. Technology transformed Ning's class to become more engaging and collaborative and new students were more skillful and ready for using digital technologies and learning on digital platforms. Because of iPad and mobile apps integration into teaching, Ning found her students felt more motivated, and their learning performance was also improved.

5.3.4.2 Ning's Perceptions of Different Barriers to Integrate Technology into Curricula: Able to cope with many high barriers

This sub-section will describe Ning's barriers that hampered her from successfully integrating technology into curricula.

Table 5.3.5 Ning's perceptions of different barriers to integrate technology into curricula (teacher survey, item 17)
The scale ranges from a very high barrier (1) to a very low barrier (5)

Different barriers to integrate technology into curricula	Ning	Different barriers to integrate technology into curricula	Ning
Technological training and support	4	University infrastructures and facilities	1
Assessment aligned with technology use	4	Budgeting for new technologies (apps)	1
Technological skills of my own	4	Technology and Internet access	1
Collaboration with other teachers	3	Time for teaching preparation	1
Subject content	3	Technical problems in the classroom	1
Teaching methods and styles	3	Teaching loads and responsibilities	1
Personal motivation	2	English proficiency of students	1
Classroom management	2	Motivation of students	1
Institutional policies and administration	2	Learning styles of students	1
Technological skills of students	2	**Mean**	**2**

Referring to the teacher survey results in Table 5.3.5, Ning's average score for barriers impeding her from technology integration into her teaching was 2. This score suggests that she encountered a number of obstacles; for example, students' lack of motivation (1), students' low proficiency (1), many teaching loads (1), little time for class preparation (1), and technical problems in the classroom (1) for her technology integration.

So, it is obvious that Ning greatly underestimated the students' digital technology use for academic purposes because she believed her students were not motivated in using technology in learning English (1) and they have poor English skills. This implies that Ning thought that the students might find it is more burdensome in understanding how to use new digital technologies in learning English.

It should be noted that Ning reported that the problem of sufficient time for class preparation (1) was a very high barrier although she taught 9 hours a week. But it can be understood that Ning taught three different courses, and she applied iPad and iTunes U course-based teaching and learning into all of the courses. This implies that Ning had to worked hard every day even on

weekends in selecting online materials, uploading them on iTunes U courses, and designing collaborative learning activities on Nearpod app.

Moreover, according to the findings in the table, Ning reported that budgeting for new technology (1) and infrastructures and facilities of the university (1) were big barriers for her in incorporating technology into curricula. Therefore, she wished the university would make an investment in purchasing educational apps for teachers and students in the future.

It is worth noting that the survey results in the above table show that Ning had many high barriers to incorporate technologies into her pedagogy. But, Ning was still positive and open-minded with technology integration into teaching. Thus, perhaps she may want to raise awareness of policy-makers and teachers to acknowledge key barriers that impeded her to succeed in technology integration and seek possible solutions in the future.

In addition, regarding teachers' reluctance of using technology, Ning reported that she knew several reasons why many Thai senior colleagues were not interested in teaching with iPads and iTunes U. First, they did not have time to learn and use new technologies. Second, they were not motivated in using digital technologies for teaching. Finally, some teachers had difficulties in working on iPad apps. They told Ning that they had tried using iTunes U course and classroom apps on their iPad, but they felt uncomfortable with reading and writing on the iPad screen.

Based on Ning's assumptions, another important factor that made the teachers disregard technology integration into instruction was the strong belief of their own "good" teaching method, which then required no improvement. Because of this, Ning believed many senior teachers then "blocked" themselves from teaching innovations with technology. They did not open their mind to integrate technology into their classroom. Therefore, these teachers still taught in the traditional teaching approach with whiteboards and markers. They used many

handouts and worksheets in their class instead of uploading online materials and learning resources on iTunes U courses for students. Because most teachers found their routine teaching easily manageable for them, they felt it was unnecessary to change their teaching to incorporate technology into their curricula. This may indicate these teachers are quite passive and not confident with operating new technologies, so they fear to investigate their use.

Ning said her colleagues commented that technology caused their teaching to become more chaotic and time-consuming in preparing contents and lessons in each session.
They stated that writing the course objectives and learning activities of every session on iTunes U platform were unnecessary and arduous jobs. Ning argued, however, that she believed all learning activity descriptions on the iTunes U course helped facilitate her class management and remind her of lessons taught in each session.

In summary, as a technological practitioner and teacher trainer, Ning found there were many obstacles impeding her from achieving technology integration into her pedagogy. Nevertheless, she was very active and highly motivated in applying iTunes U and Nearpod because she found the value in digital technologies that can improve students' learning motivation and their English proficiency and her professional development.

Referring to the findings in Table 5.3.5 where Ning rated institutional policies and administration as a high barrier, the next findings will reveal with which policies she was dissatisfied.

5.3.4.3 Ning's Satisfaction with the University's Policies about Technology: Moderately satisfied

In this sub-section, I will describe Ning's survey findings for item 19 followed by my interpretation.

Table 5.3.6. Ning's satisfaction with the university's policies about technology (teacher survey, item 19)

The university's policies about technology	Ning
a) Creating iTunes U courses.	5
b) Encouraging the use of iPads and other technologies.	5
c) The university's technological support and training.	4
d) Increasing technology integration.	3
e) Taking online exams on iPads.	2
f) The university's technological infrastructure.	1
Mean	**3.33**

Referring to the teacher survey results in Table 5.3.6, it is surprising that Ning's satisfaction level with the university's technological policies was not very high (3.33), which was lower than Bee's (B = 3.83) and Sam's (S = 4.17). I think it is understandable that the majority of teachers, who were not very comfortable with technology integration into the curricula, may feel more neutral or perhaps only slightly positive with the university policies relating to technology (3.57). But for Ning, her average satisfaction (3.33) was perplexing to me as she said in the interview that she received good support from the university.

The findings in the table above show that Ning was unsatisfied with the university's technological infrastructure and facilities (1) and the policy of taking online exams (2). Based on the previous finding in Table 5.3.5, as Ning rated budgeting for new technologies (apps) as a very high barrier, this may imply her dissatisfaction with the university's technological facilities. Ning would like the university to provide free access to classroom apps for teachers. Similar to Bee and Sam, Ning did not quite agree with the idea of taking online exams on iPads although she was skillful in using iPads.

I interpret Ning's findings that as Ning always used iTunes U courses, Nearpod app, and websites for teaching and learning, she was very concerned with the unreliability of the campus Internet network, slow speed, and inaccessibility of Wi-Fi in the classrooms. Ning said in the

interview that she often encountered the loss of Internet connection in the classroom and that it ruined her entire lesson plan.

Finally, it is noteworthy that Ning's neutral response (3) on the policy of increasing technology integration was not expected because she seemed passionate about using technology. Moreover, she stressed during the interview that all teachers should integrate technology in teaching because she found it was productive and time-saving in the long run. This result was also in conflict with her high satisfaction on the policies in designing iTunes U courses (5) and encouraging the use of iPads and other technologies (5). Overall, these findings may be interpreted that Ning was very satisfied with teaching with iPads and iTunes U. Thus, she wished that the university focus on mainly iTunes U courses and iPad-enhanced language teaching, not other digital platforms.

In summary, Ning was quite positive with the university polices regarding technology integration into teaching and learning, but she was not satisfied with the university's technological infrastructures and the policy about taking exams on iPads.

The analysis of the aforementioned findings relating to Ning's perceptions of students' digital technology use in Section 5.3.2 and technology integration in this Section 5.3.3 can provide a greater understanding of Ning's technology application into curricula in the next section.

5.3.5 Ning's Technology Application into Curricula: Extensively applied iPad-based teaching, iTunes U courses, and Nearpod app in her classes

Ning's findings from two class observations and two interviews will be demonstrated followed by my interpretation to answer the fourth research question, "how do in-service teachers' perceptions of how they and student use technology inside and outside of the classroom impact

how the they apply technology to their pedagogical practices?" The following description is Ning's technology application into her pedagogy.

Ning is a very experienced teacher in teaching translation. She is not interested in using social media and various digital tools for non-academic purposes. However, for academic purposes, she is reflective and open-minded to apply iPads and several technological tools to teach, such as Explain Everything, Socrative, SlideShark, Nearpod, iTunes U, Google Docs, iMovie, and E-books for seven years to enhance her own teaching and to make her classes fun, motivate her students in learning, and train them to use new technology to facilitate their own self-regulated learning. She is also interested in self-taught learning about educational technologies.

Ning has started applying iPads into teaching in 2011 and built her passion and expertise of technologies since then. Ning's translation course can be called "*authentic* iPad-enhanced language teaching". She said, "I use only iPad to do everything". In the translation class, she did not bring a textbook, papers, and a thumb drive to the class. It is quite a distinctive, unique teaching style different from Bee and Sam. Every teaching material and resource was digitized and uploaded to the iTunes U course app on her iPad, which makes everything easily accessible under her control. Every student used an iPad to participate in the class, access the lesson, read presentation slides, take notes, and send assignments via the iTunes U course and Nearpod all the time.

Generally, Ning created an iTunes U course and applied its productivity and functions substantially. She said she acted like a "counselor" in the first class as she had to train students how to use the iTunes U course. Moreover, she designed a learning platform on the Nearpod app for students to write a translated version. Through the Airplay mode from Ning's iPad, students could see other friends' work and learning from their peers. The airplay presentation was fast

and convenient where Ning could present the students' work while she moved around and monitored the class. In the class, Ning also allowed students to access websites and mobile dictionary apps to search for unknown words' meanings.

Ning added that the Nearpod app allowed her to check students' attendance and class participation regarding class assignments. She could check immediately if students attended the class on time. In addition, the app helped her manage the students' assignments better. She used to have a problem of locating students' papers, but now all assignments were digitized and easily checked through the Nearpod app.

In addition, it is worth noting here that Ning's students reported positive attitude towards Ning's teaching style. They have learned to use online sources, choose reliable ones, create digital texts, share and discuss their translated work to the class. They believed digital technology was very useful and convenient and it facilitated their collaborative learning in the class because it was easy to share opinions and discuss the use of words on Google Docs. They said they did not feel bored in the class, and the technology made learning more accessible and engaging. The students respected and admired Ning as a very proficient teacher, who was capable of integrating technologies skillfully and professionally.

I believe the prospective benefits of applying mobile apps and iPads in Ning's class may stimulate active teachers who wished to start using digital technology to have more confidence in learning to use any technology as their preference. In addition, any teachers who seem to experience "technophobia" might be more open to technology affordance and become motivated to integrate technology into instruction for their digital literacy development and for students' improvement in digital technology-enhanced learning.

In summary, although Ning is a "digital immigrant" based on her age of over 50, she is competent in delivering her teaching with her iPad and used Google Docs, Nearpod, iTunes U course, dictionary online apps, and websites to make learning and teaching more convenient, accessible, and engaging in the translation class. Her students also had great opportunities to be exposed to digital platforms and intuitively acquire digital literacies without formal instruction.

In the next section, I will describe Ning's survey results for her evaluation on the variability of various digital technology-enhanced activities followed by my interpretation.

5.3.6 Ning's Evaluation on Digital Web 2.0 Technology-enhanced Activities in Improving Digital Literacy Skills: Liked to have technology mentors, created YouTube videos, a teacher website and digital stories

As can be seen from the previous findings, it is essential to find effective methods to develop teachers' digital literacy skills. In this section, Ning's findings will answer the fifth research question, "how do the in-service teachers evaluate the usefulness and viability of various digital technological resources?"

I will present Ning's survey results for her perceptions of digital technological resources followed by my interpretation.

Table 5.3.7 Ning's evaluation of digital web 2.0 technology-enhanced activities (teacher survey, item 20)

Digital web 2.0 technology-enhanced activities	Ning
a) Having a technology mentor / tutor	4
b) Creating a YouTube video project	4
c) Creating a digital storytelling project	4
d) Creating a teacher website	4
e) Creating an e-teaching portfolio	3
f) Creating a teacher blog	3
g) Creating a Twitter	2
h) Creating a Facebook page for teachers	1
i) Creating a LINE group to discuss technology use	1
Mean	**2.67**

Based on Ning's results in Table 5.3.7, her average score for these digital web 2.0 technology-enhanced activities was only 2.67, which was rather low. As seen in the table, Ning preferred to have a technology mentor (4), create a YouTube video (4), design a teacher website (4), and make a digital story (4), so her responses were identical to Bee's.

According to the Ning's interview findings, she liked to create multimodal projects with iMovie. Referring to Ning's rating score for a teacher blog (3), she said blogging required an extensive writing process that she was not certain if she had time to write a long blog. As Ning rated a very low satisfaction with creating a LINE group (1) and forming a Facebook page (1), this indicates that she may not believe sharing technology knowledge on social media was a good and practical activity. The evidence for supporting this interpretation is that Ning was not interested in self-promotion on Facebook and other digital communities. She said forming a community of practice (COP) to develop educational technology skills for UTCC faculty members was very challenging. Ning said at present there were only three active teacher trainers running technology workshops across the university. In addition, there was no institutional policy about organizing a COP group at the UTCC.

According to the teacher survey result of the question 16, Ning rated very low at 1 for comfort with faculty collaboration in designing technology-enhanced activities. She said most of her colleagues were not very interested in using technologies for teaching. This notion may thus deny her the opportunity to work collaboratively with other teachers. The findings show that working environment and attitudes are important factors in promoting and preventing a knowledge-sharing community to be formed.

In summary, Ning was interested in developing her digital literacy skills by having a technology mentor. She also believed creating YouTube videos, teacher websites, and digital stories were great ideas to practice using digital technology tools.

5.3.7 A Summary of Ning's Findings and Interpretations

I discovered that Ning's profile was amazing. I admire her strong ambition and dedication for her professional growth. Based on an internal source and the conversation with the dean of HMA school, among over 100 HMA faculty members, Ning is a pioneer in technology integration. She has courage to change, and embrace digital technologies especially classroom apps for her teaching.

In fact, Ning was not interested in using technologies and social media for her pleasure. But to pursue teaching excellence and professional development, she enthusiastically devoted her full time to experimenting with classroom apps, preparing innovative iPad-enhanced lessons on iTunes U courses, and designing engaging learning activities on Nearpod app. Therefore, she was awarded as *Best of the Best* and *Teaching Excellence* in 2017.

Ning believed technology was beneficial for her teaching development and especially for students' learning progress and achievement in the digital age. She said she followed the trends of digital technology particularly to offer new technology-enhanced learning opportunities to her

students. Ning thought it was useful and essential for students to have digital literacy skills to foster their ubiquitous learning in this digital era.

Furthermore, this year she is very determined to become an Apple professional development (APD) trainer to develop her teaching professionalism. She would like to share her skills and knowledge of technology integration with other teachers. She also aims to improve students' digital literacy as she says it is essential in the digital age. Ning had a plan to create online courses, and she was interested in designing multimodal presentations.

According to all Ning's findings, I believe Ning can be a good example in developing herself to some extent to become a "digitally literate teacher" in the digital era of the 21st century. However, it will be good if Ning develops her skills and knowledge about emerging social media and then incorporate them into her professional teaching because I believe the leverage of social media will affect new learning styles of Generation Z.

In summary, Ning is a disciplined and dedicated teacher and "rigorous trainer". Her class demonstrated a paperless productive learning environment in which students were engaged with mobile apps, searching for additional information on websites, and utilizing the iPad's affordance. She has a strong passion to become a leading technology teacher trainer of the university.

The next findings and interpretation will focus on the results of three teachers' digital literacy assessment informed by the TPACK framework.

5.4 The Three Teachers' Digital Literacy Competence Informed by the Technological Pedagogical Content Knowledge (TPACK) Framework

This section deals with the key findings of the three focal teachers' digital literacy understanding and competence informed by the technological pedagogical content knowledge

(TPACK) framework. As the goal of the study is to assess the digital literacies of teachers, it is essential to investigate in-depth how the selected teachers, Bee, Sam and Ning, perform and understand the concept of digital literacies guided by the TPACK framework.

Based on the fact that all teachers have special and outstanding areas which they may learn from one another if they are open to share their teaching skills. For this objective, teachers should be aware of their teaching performance with technology and should have opportunities to do self-evaluation through valid and reliable assessment. Therefore, I used two frameworks. First, I included the TPACK framework as an initial stage of assessing the teachers' digital literacy because the TPACK has been the accepted standard in academia for many decades. The framework was not, however, initially designed to conceptualize digital literacy skills, so I supplemented the TPACK framework by the digitally literate teachers (DLT) framework, which I will apply for digital literacy assessment in the next section.

The detailed descriptions and comparisons of the three teachers present vivid pictures of the teachers' digital literacy skills in both their strong and weak areas. For example, the teachers are willing and open to use digital tools to develop their pedagogical practices. However, they should explore the benefits of Twitter, Instagram and online games as the students nowadays benefit from these affordances in improving English skills. Later, these invaluable findings can help teacher educators to customize teaching and technology training workshops to best suit teachers' wants and needs.

The data were collected from the self-assessment survey of the three teachers, my class observation field notes, and interview transcriptions. In addition, I conducted content analysis of unobtrusive data of learning artifacts to evaluate the teachers' digital literacies. All my

interpretation is grounded by TPACK framework, which is thoroughly described in the literature review Chapter 2 in Section 2.3.1.

To triangulate the teachers' findings, I additionally include my evaluation score based on my pedagogical knowledge justified by a Master's degree from Teaching English as a Foreign Language (TEFL) and 12-year English language teaching experience and certified teaching awards. I think my evaluation presented in brackets will provide deeper insights from a third party to assess three teachers' digital literacy skills more precisely. Without brackets, it means my scores for teachers are the same as their assessment score.

I divide this result section into eight sub-sections based on the components of TPACK principles as follows:

5.4.1 Individual Components in Comparison - Technological Knowledge (TK): Ning was the most competent.

In this sub-section, I will describe the self-assessment results of three teachers for TK competence followed by my interpretation.

Table 5.4.1 Individual components in comparison - Technological Knowledge (TK) (teacher survey 2, item 2.1)

Note: Researcher's evaluation appears in the brackets.
The score without the adjacent brackets means the researcher agrees with the teachers' self-assessment score.

Component 1: Technological Knowledge (TK)	Bee (B)	Sam (S)	Ning (N)
a) I know how to solve my own technical problems.	3	4	3
b) I can learn technology easily.	4	4 (3)	4
c) I keep up with new technologies.	3	4	4
d) I frequently play around with the technology.	3	3	5 (4)
e) I know about a lot of different technologies.	3	4 (3)	4
f) I have digital technology skills.	3	5 (3)	4
g) I have had sufficient opportunities to work with different technologies.	3	4 (3)	3
Mean	**3.14**	**3.81**	**3.86**
Mean assessed by the researcher	(3.14)	(3.29)	(3.71)

The teachers' self-assessment results of TK in Table 5.4.1 show that Sam and Ning thought their technological skills were in the high level as 3.81 and 3.89, while Bee considered herself in the medium level at 3.14.

Bee

Based on my class observation, I saw Bee very skillful in using Kahoot and YouTube video clips as well as the use of MS Word and Excel for her pedagogical practices. But I still wanted to keep it as 3 because she did not expose herself to various social media, and she did not apply iPad technology into her teaching like Ning. However, Bee reported she was open to new technologies and willing to learn them (Bb = 4), and I agree. Thus, my evaluation score of TK for Bee was equal to Bee's self-assessment score (3.14).

Sam

Sam's score of TK was 3.81, but I think he overestimated himself. According to the interview with Sam about his lifestyle of using technology, he was not very comfortable with keying on a touch screen of the smartphone, so he still uses a Blackberry which has key buttons. From my understanding, skills of using touch-screen technology devices are the essential part of digital literacies. Based on the teacher survey findings, he also never used several social media, such as Instagram, Pinterest, and Skype. Thus, his self-assessment score (3.81) was dropped to 3.29.

Ning

Ning weighed herself quite high (NQ2.1 = 3.86), which I mostly agree with based on her skills in using Nearpod, iTunes U courses and iMovie. Besides, she received many mobile app training sessions and dedicated most of her time with learning new educational apps. However, I am skeptical about her high rate of playing around with technologies (Nd = 5) because she did not integrate any social media to enhance teaching and learning. So, I think the level of 4 is probably more suitable for Ning about the issue of experimenting with technology. As a result, her score was slightly dropped to 3.71.

In summary, it is obvious that Ning performed the best in comparison to Bee and Sam for technological knowledge (TK). This finding may indicate that technology knowledge is learnable and Ning's internal high motivation for self-promotion may greatly trigger her drive and passion for technology knowledge and practice.

5.4.2 Individual Components in Comparison - Content Knowledge (CK): Sam outperformed

In this sub-section, I will describe the self-assessment results of the three teachers for CK competence followed by my interpretation.

Table 5.4.2 Individual components in comparison - Content Knowledge (CK) (teacher survey 2, item 2.2)

Note: Researcher's evaluation appears in the brackets.
The score without the adjacent brackets means the researcher agrees with the teachers' self-assessment score.

Component 2: Content Knowledge (CK)	Bee (B)	Sam (S)	Ning (N)
a) I have sufficient knowledge about English literacy.	4 (5)	5	4
b) I have various strategies of developing my understanding of English literacy.	4	5	4
Mean	**4**	**5**	**4**
Mean assessed by the researcher	(4.5)	(5)	(4)

The teachers' self-assessment results of CK in Table 5.4.2 show that all three teachers rated themselves a high score (B = 4, S = 5, N = 4). These scores imply they were all confident with their content knowledge.

Bee

Bee gave a high score to herself (4). However, I think Bee deserved 5 the same as Sam for her good knowledge of English and has been teaching basic English skills for almost ten years, and her educational degrees focus on English language studies. Furthermore, in this semester she taught only one course for six groups. Thus, Bee's CK average score should be increased to 4.5.

Sam

Sam rated himself the highest score as 5 for CK. Sam is a native speaker of English and has had over 26 years of English teaching experience. He showed his competence of understanding the subject contents. Moreover, Sam reported that this was the third time that he taught this course, so I believe that he has developed his expertise in his CK.

Ning

Ning gave a high score to herself (4). I think her high confidence results from the fact that she received a Master's degree in Translation, and she has been teaching translation courses for over

17 years. Thus, she believed she specialized in CK and in my view, she also deserved a high score as 4 for CK.

In summary, Sam was the most proficient teacher for CK. I think Bee's knowledge about English proficiency was slightly above Ning's because Bee taught general English course, and she received a doctoral degree in English language studies. However, in this digital age, I believe the content knowledge that good teachers should excel may not be sufficient if they reject technology integration into curricula. I believe digital technologies are necessary to enhance learning and teaching development and create new learning resources and platforms for learners.

5.4.3 Individual Components in Comparison - Pedagogical Knowledge (PK): Ning was the best performer.

In this sub-section, I will describe the self-assessment results of the three teachers for PK competence followed by my interpretation.

Table 5.4.3 Individual components in comparison - Pedagogical Knowledge (PK) (teacher survey 2, item 2.3)

Note: Researcher's evaluation appears in the brackets.
The score without the adjacent brackets means the researcher agrees with the teachers' self-assessment score.

Component 3: Pedagogical Knowledge (PK)	Bee (B)	Sam (S)	Ning (N)
a) I can assess student performance in multiple ways.	4	5 (4)	5
b) I can adapt my teaching to match students' proficiency level.	4	5	5
c) I can adapt my teaching style to different learners.	4	5 (4)	5 (4)
d) I can use a wide range of teaching approaches in a classroom.	4	4	4
e) I am familiar with common students' understandings and misconceptions.	4	4	4
f) I know how to manage a classroom.	4	4	5
Mean	**4**	**4.50**	**4.67**
Mean assessed by the researcher	(4)	(4.17)	(4.5)

The teachers' self-assessment results of PK in Table 5.4.3 show that for holistic evaluation of teaching competence, all three teachers rated themselves high (B = 4, S = 4.5, N = 4.67).

I noticed that they performed very impressively in conducting organized lectures and clear presentations.

Bee

Based on my class observation, Bee taught professionally in delivering well-organized lectures and clear presentations. She was able to use her teaching materials skillfully to afford students' learning. Bee knew her students' names and cared for their learning behaviors although it was a big class of more than 40 students. She implemented gamified activities on Kahoot to assess students' understanding. Hence, I think it is reasonable for Bee to get a high score as 4 for all sub-components of PK.

Sam

The self-assessment results in Table 4.6.3 reveal Sam's self-assessment average score for PK was very high as 4.5. For PK competence, I discovered that Sam gave the lectures professionally and used his teaching materials proficiently. Sam had good analytical skills and could expand students' perspectives and knowledge with his insightful questions.

However, his assessment on student performance was mainly based on individual oral presentations with PowerPoint slides and written exams. He adopted student-centered instruction but still used a lecture-based approach. Because Sam did not create an engaging learning activity in which students were assigned to work in pairs or a group the same as Bee and Ning, I decreased his PK score from 4.5 to 4.17 according to my personal perceptions.

Ning

Ning's PK score was very high at 4.67, which shows she believed her teaching approaches worked well with her students. Ning used various engaging task-based activities with technology integration to motivate her students in learning with enjoyable group activities.

But, according to her students' reports, she was very strict with her teaching style and did not accommodate the students' needs as expected. Thus, her average score for PK was dropped from 4.67 to 4.5.

In summary, Ning demonstrated her pedagogical knowledge (PK) more effectively than Bee and Sam as she integrated Nearpod, iTunes U, and websites into her collaborative learning and teaching approach. It is worth noting that good teachers should take into consideration adapting their teaching style to match students' needs and their learning styles. Moreover, at present, the PK will be outstandingly productive if a teacher is confident and willing to use a variety of teaching approaches that often blend new digital literacy in his or her instruction.

5.4.4 Individual Components in Comparison – Pedagogical Content Knowledge (PCK): Sam and Ning were top.

In this sub-section, I will describe the self-assessment results of the three teachers for PCK competence followed by my interpretation.

Table 5.4.4 Individual components in comparison - Pedagogical Content Knowledge (PCK) (teacher survey 2, item 2.4)

Note: Researcher's evaluation appears in the brackets.
The score without the adjacent brackets means the researcher agrees with the teachers' self-assessment score.

Component 4: Pedagogical Content Knowledge (PCK)	Bee (B)	Sam (S)	Ning (N)
I can select effective teaching approaches to guide students in learning English.	4	5 (4)	5 (4)

The teachers' self-assessment results of PCK in Table 5.4.4 show that the teachers were all confident in their good competence in PCK especially Sam (5) and Ning (5).

Bee

I believe Bee deserved a high score for PCK at 4. I found Bee explained linguistic features clearly to the students and created fun, gamified learning activities to assess the students'

knowledge of the taught grammar and vocabulary lessons. It appears that she aims to be a good, understanding language coach by introducing external resources about English learning on YouTube to her students for their self-study outside the class.

Sam

Sam rated his PCK the highest as 5. This may be because based on his understanding of the students' high satisfaction with his caring, understanding characteristics. In addition, he was confident in his content knowledge, and his effective teaching styles that he enabled students to understand the lessons clearly with his creative questioning skills.

But based on my class observation in Sam's class, apart from lectures and class discussions he did not show his creativity to implement innovative learning activities that developed students' critical and reflective thinking and fostered their English proficiency skills in the course content. So, I decreased his PCK score to 4.

Ning

According to Ning's PCK score at 5, I think Ning might have deserved 5 if she listened to her students' needs. She may try adjusting her class management approach to make the students feel more comfortable in being informed about course assignments. Thus, I decreased her PCK score to 4.

In summary, Sam and Ning estimated their PCK very high as 5, but I think all three teachers should have the same score as 4. I believe they are good and confident in selecting appropriate digital tools for their teaching. But, I expect to see more engaging and creative teaching strategies and learning activities to match different learning styles of young students.

5.4.5 Individual Components in Comparison - Technological Content Knowledge (TCK): Ning was the most competent.

In this sub-section, I will describe the self-assessment results of the three teachers for TCK competence followed by my interpretation.

Table 5.4.5 Individual components in comparison - Technological Content Knowledge (TCK) (teacher survey 2, item 2.5)

Note: Researcher's evaluation appears in the brackets.
The score without the adjacent brackets means the researcher agrees with the teachers' self-assessment score.

Component 5: Technological Content Knowledge (TCK)	Bee (B)	Sam (S)	Ning (N)
I know about technologies that I can use for understanding English literacy.	3 (4)	3	4

The teachers' self-assessment results of PCK in Table 5.4.5 show that Bee and Sam rated the same as average at 3, whereas Ning thought she had a high TCK at 4.

Bee

Bee gave herself 3 for PCK, but I discovered that she knew how to apply her teaching technologies very well, such as using grammar websites and YouTube videos to increase her content knowledge of the course. Thus, I increased Bee's score to 4.

Sam

Like Bee, Sam's TCK score was 3 that was his lowest score compared to the other components. This suggests that he realized that he did not know how to use various technologies to improve his knowledge of content. He reported that he always read newsfeeds on his mobile phone and searched for information on websites as resources for his better understanding of the course content. I also agree with his TCK score (3) because he did not demonstrate it as clearly as Bee (4) and Ning (4).

Ning

I rated Ning 4 as well because I noticed that she could use a wide range of websites to improve her understanding in selecting appropriate words for translating.

In summary, Ning performed the best for TCK competence whereas Sam might need to develop this knowledge the most. I believe TCK can be named as digital literacy knowledge in this age, so every teacher should be responsible to develop this knowledge as much to follow the trend of emerging technologies and social media that facilitate English language learning nowadays.

5.4.6 Individual Components in Comparison - Technological Pedagogical Knowledge (TPK): Ning was outstanding.

In this sub-section, I will describe the self-assessment results of three teachers for TPK competence followed by my interpretation.

Table 5.4.6 Individual components in comparison - Technological Pedagogical Knowledge (TPK) (teacher survey 2, item 2.6)

Note: Researcher's evaluation appears in the brackets.
The score without the adjacent brackets means the researcher agrees with the teachers' self-assessment score.

Component 6: Technological Pedagogical Knowledge (TPK)	Bee (B)	Sam (S)	Ning (N)
a) I can choose appropriate technologies that enhance the teaching approaches for a lesson.	4	3	5
b) I can choose appropriate technologies that enhance students' learning for a lesson.	4	3	4
c) I think critically when I use technology in my classroom.	4	4	5 (4)
d) I can adapt the use of the technologies to different teaching activities.	4	4	5
Mean	**4**	**3.5**	**4.75**
Mean assessed by the researcher	(4)	(3.5)	(4.5)

The teachers' self-assessment results of TPK in Table 5.4.6 show that Bee and Ning were very confident in their critical thinking skills in selecting and using technologies to facilitate

teaching and develop students' learning (B = 4, N = 4.75). It is interesting that Sam was the least confident for his TPK (S = 3.5).

Bee

Bee was assured of her high TPK (4). She said she had integrated digital technology for several years into her classroom at another university. She used Kahoot gamified activities to monitor students' learning progress, and review vocabulary and lessons in every session as well as to get the students to enjoy English lessons with her. Therefore, it is reasonable for me to rate her 4 as well.

Sam

The findings in Table 5.4.6 reveal that Sam rated himself the lowest score among all seven components. This suggests he was not very confident to some extent which technology accommodated his teaching and expanded the students' skills and competence. This may be because he has not yet explored and implemented emerging digital technology tools into his teaching besides LINE and Facebook. As observed, Sam used traditional teaching approaches with the affordance of PowerPoint slides illustrated by Google images and websites. Accordingly, I rated Sam the same score at 3.5.

Ning

Ning scored herself very high for TPK at 4.75. This indicates that she believed an iPad was a good mobile learning tool that facilitated her teaching practice. Based on my class observation, Ning was able to apply an iPad-based teaching approach skillfully. She used a variety of digital technologies, websites, Nearpod, iTunes U, and Google Docs, to enhance her pedagogy. She was also creative in designing an innovative technology-enhanced project for students. For the final

project of her class, she assigned students to make a news broadcast video clip by using the iMovie app or other applicable tools.

However, I think Ning's score for critical thinking skills on using technology (Nc = 5) should be decreased to 4. I think Ning should have been more thoughtful that informing students about an assignment can be conducted during the classtime and on iTunes U course for students' reference. Therefore, Ning's score should be decreased to 4.50.

In summary, Ning performed the best for TPK as she integrated technology for her teaching longer than Bee and Sam based on the interview findings. The TPK is the strongest for Ning, which was supported by her outstanding recognition award as the "Best of the Best" for teaching excellence in 2017 by the university.

5.4.7 Individual Components in Comparison - Technological Pedagogical Content Knowledge (TPCK): Ning was the most knowledgeable.

In this sub-section, I will describe the self-assessment results of three teachers for TPCK competence followed by my interpretation.

Table 5.4.7 Individual components in comparison - Technological Pedagogical Content Knowledge (TPCK) (teacher survey 2, item 2.7)

Note: Researcher's evaluation appears in the brackets.
The score without the adjacent brackets means the researcher agrees with the teachers' self-assessment score.

Component 7: Technological Pedagogical Content Knowledge (TPCK)	Bee (B)	Sam (S)	Ning (N)
a) I can combine literacy, technologies, and teaching approaches for teaching.	3 (4)	4 (3)	4
b) I can select technologies to enhance my teaching.	4	4	5
c) I can use strategies that combine content, technologies, and teaching approaches in my classroom.	3 (4)	5 (4)	5
d) I can help others to integrate the use of content, technologies, and teaching approaches.	3	3	4
Mean	**3.25**	**4**	**4.5**
Mean assessed by the researcher	(3.75)	(3.5)	(4.5)

The TPCK is the gist of applying all three knowledge components: technology, pedagogy, and content effectively in practices. The teachers' self-assessment results of TPCK in Table 5.4.7 show that Ning rated herself highest (N = 4.5) in comparison to Sam and Bee. Sam rated himself high (S = 4) whereas Bee was the humblest in the group (B = 3.25).

Bee

Bee rated her TPCK only 3.25 which seemed to be too underestimating. This may be because she was aware of her low technological skills. But I think her score should be higher at 3.75. Based on my class observation, Bee efficiently incorporated websites and YouTube video clips to motivate students to understand the content better with her coaching role. She created fun vocabulary games with Kahoot to increase students' motivation to memorize the content and I noticed the students were enjoyably engaged with the lessons. Besides, she had good communication skills and explained the lessons clearly.

In addition, she believed in her competence of pedagogical and content knowledge by saying, "With a 10-year experience in teaching, it has strengthened my skills and knowledge about teaching and content I have taught. In addition, along the way of my teaching career, I have also been trained for teaching development." As a result, Bee's TPCK score should have risen to 3.75.

Sam

The high TPCK score of Sam (4) presented in Table 5.4.7 shows that he was very confident in his strategies to combine TPCK in the classroom (Sc = 5). PK was his strongest skills owing to over 26 years of teaching experience. He said, "I know what works and does not work for me, and I know how to reach and engage students, no matter what topic. I always try to put myself in their place". However, Sam admitted that CK was the most challenging for him. For example, he

said it took him a semester to feel competent in teaching English for Public Relations with a textbook and teacher's manual.

I also discovered that Sam has not been yet initiative to incorporate engaging technology-enhanced language learning activities to improve students' English learning ability. This interpretation is additionally supported by Sam's remarks that he wished he would have implemented varying fun activities in the class. Sam's limited TK, CK and lecture-based teaching approach caused his TPCK score lower to 3.5.

Ning

Ning's very high TPCK score (4.5) was justified for me based on her two certified teaching excellence awards. Ning could demonstrate outstanding performance in applying Nearpod, iTunes U, and Google Docs in presenting lessons, discussing students' work, monitoring class, and grading through the iPad-based teaching approach. She showed her creativity in designing a multimedia news reporting project that encouraged students to use mobile apps to make a digital video.

According to her interview findings, she confidently said, "I am competent and confident in all knowledge about TPACK principles because I have taught English for 16 years. Through trials and errors, I have found the right methods and applications for teaching all my courses". As a result, it is sensible that she reached a high TPCK score at 4.5.

In summary, Ning was the most knowledgeable for all seven components in the group. Bee was also a proficient teacher, but I think she underestimated her TPACK competence. Sam was the most confident for his PK and CK. It is apparent that Bee and Sam were aware of their weakness in TK.

5.4.8 A Summary of the Teachers' TPACK Findings and Interpretations

To understand the complete picture of the three teachers' digital literacy competence, in this sub-section, I present the teachers' self-assessment results guided by TPACK principle in Table 5.4.8 followed by my interpretation.

Table 5.4.8 TPACK components in comparison (teacher survey 2, item 2)
Note: Researcher's evaluation appears in the brackets.
The score without the adjacent brackets means the researcher agrees with the teachers' self-assessment score.

7 TPACK Components	Bee	Sam	Ning
1. Technological Knowledge (TK)	3.14 (4)	3.81 (3.29)	3.86 (3.71)
2. Content Knowledge (CK)	4 (4.5)	5	4
3. Pedagogical Knowledge (PK)	4	4.50 (4.17)	4.67 (4.50)
4. Pedagogical Content Knowledge (PCK)	3 (4)	4	4
5. Technological Content Knowledge (TCK)	3 (4)	3	4
6. Technological Pedagogical Knowledge (TPK)	4	3.50	4.75 (4.50)
7. Technological Pedagogical Content Knowledge (TPACK)	3.25 (3.75)	4 (3.50)	4.50
Mean	**3.48**	**3.97**	**4.23**
Mean assessed by the researcher	(3.91)	(3.78)	(4.17)

The teachers' self-assessment results of all seven TPACK components in Table 5.4.8 show that Ning believed she was the most proficient teacher in terms of TPACK competence. Generally, all three teachers were confident in their CK, PK, and PCK, and they were aware of their own need to develop technological components.

Bee was the least confident and scored her TPACK only above average; however, I think she outperformed Sam. Bee was very humble because as a new young teacher she might find there were a great deal of innovative skills and knowledge to acquire as a language teacher. I found this perspective was good for novice teachers as it implies that they would be eager to develop themselves gradually.

Sam rated his TPACK competence at a high level (3.97). This may be because he is confident with his expertise in teaching as a very experienced teacher. Sam has taught English over 25

years and his mother tongue is English. However, I generally rated Sam slightly lower to 3.78 because I have not seen him implement various kinds of teaching strategies and incorporate any productive technology-enhanced learning activities.

Ning performed the best in this group and gave herself a high score at 4.23 which was slightly different from my evaluation (4.17). Ning was aware of her lowest skills in TK (3.86). This may be because she realized that she was not interested in exploring and using various digital technologies and social media for academic and non-academic purposes.

Having many years of teaching experience is always good, but it is invariable that to some degree senior teachers refrain from taking risks in initiating creative teaching approaches and learning projects. The experienced teachers get accustomed to the same teaching styles. They may also believe erroneously that their teaching is good enough if they are being evaluated with an old assessment tool like the TPACK.

The TPACK focuses on abilities in teaching and class management facilitated by technology in general; thus, it is clear that its principle may be inadequate in assessing digital literacy skills. As digital literacies are broad, deep and evolving, relying on one assessment instrument is too limited. So I included digitally literate teachers (DLT) principle to bridge the gap of the TPACK model and fulfill the goal of this study to understand and assess digital literacy skills and knowledge of teachers.

In the next section, I will describe the three teachers' digital literacy competence informed by the DLT framework.

5.5 The Three Teachers' Digital Literacy Competence Informed by Digitally Literate Teacher (DLT) Framework: Ning was the most confident as a digitally literate

The DLT framework, which comprises seven essential themes and skills related to digital literacies serves as an essential criterion to evaluate the three teachers' competence of being a digital literate teacher in the digital age. According to White's DLT framework (2015), digital literacies are operationalized by two components: 1) a concrete wide range of digital skills set, such as ICT literacy and media literacy, and 2) main issues and themes relating to digital literacy, such as understanding one's own digital needs and those of students, and awareness of digital identity. White (2015) proposed that it is more logical to start looking at an issue and theme-based approach and then consider skills and abilities.

Unlike the TPACK framework, the DLT principles include complex conceptual issues that I think are somehow intuitive and not measurable. Thus, I would not include my evaluation score for teachers because it is beyond the scope of my observation.

Therefore, the three teachers' digital literacy competence informed by the seven strands of the DLT framework will be described into eight sub-sections followed by my interpretation as follows:

5.5.1 Individual strands in comparison – Strand 1

5.5.2 Individual strands in comparison - Strand 2

5.5.3 Individual strands in comparison - Strand 3

5.5.4 Individual strands in comparison - Strand 4

5.5.5 Individual strands in comparison - Strand 5

5.5.6 Individual strands in comparison - Strand 6

5.5.7 Individual strands in comparison - Strand 7

5.5.8 A summary of the teachers' DLT findings and interpretations

The detailed descriptions and comparisons of three teachers' DLT assessment will help inform teacher educators to design teacher training agenda and workshops on digital literacy development which would purposefully serve teachers' needs and wants for specific areas.

5.5.1 Individual Strands in Comparison – Strand 1: Ning was the most competent.

In this sub-section, I will describe the self-assessment results of the three teachers for Strand 1 competence followed by my interpretation.

Table 5.5.1 Individual strands in comparison – Strand 1 (teacher survey 2, item 3.1)

S1. Understanding your own position as a digitally literate teacher and the relationship between skills and practice.	Bee (B)	Sam (S)	Ning (N)
1.1 Understand my own digital needs, abilities and practices and aim for professional growth.	3	4	5
1.2 Understand the relationship between digital literacy and my subject contents.	3	3	5
Mean	**3**	**3.5**	**5**

The teachers' self-assessment results in Table 5.5.1 show that Ning was the most confident in her understanding of being a digitally literate teacher based on her full score at 5. Bee was most modest for her strand 1 competence and rated herself only 3 whereas Sam was in the medium level (3.5).

Bee

Bee knew her digital needs because she wanted to embed more online teaching materials and English dictation games in the class to engage students' interest and develop her teaching approaches. But based on her rating score as 3, she was also not very certain about her competence as a digitally literate practitioner who knows how to integrate digital literacies into her course. This may be because she realized she lacked frequent digital engagement in social media and digital technologies.

Sam

Sam rated himself at the medium level (3.5) because Sam said he knew his digital needs and was always open to develop his professionalism around digital literacy and digital technologies. For example, he chose to use Facebook to reach his students as quickly as possible to send his message when he had to go to class late. He was comfortable with Facebook and knew that students liked to use it.

However, it is not quite clear to me how Sam developed his digital literacy skills because basically he used digital technology in the class as "a teaching tool". In addition, he was aware of his limited exposure to new digital technology use by saying, "I am not the first to use the latest technology in class".

Ning

Ning was very confident that she understood her digital needs and abilities to use digital technologies to benefit her subject content according to her full mark (5). She said, "I am a 21st-century teacher and quite good at education technologies. But I still need to learn more about new education technologies".

I found this claim and her score reasonable because she is knowledgeable about a diverse range of classroom apps. In addition, she applied the Nearpod app and iTunes U into the classroom very skillfully. I saw Ning design collaborative learning spaces where students cooperated with their peers on writing translation work on the Nearpod app. She knew her digital needs and focused on her professional development plans to become a teacher trainer of Apple Reginal Training Center of the university within the year 2018.

In summary, Ning was the most confident in her identity as a digitally literate teacher whereas Bee and Sam were not very self-assured of their digital needs and role of digital literacies in their

subjects. This indicates it is important for teacher educators to convince teachers to first realize that they should strive to become digitally literate teachers who are very proficient in integrating digital literacies in their curricula.

5.5.2 Individual Strands in Comparison – Strand 2: Ning believed she developed students' digital literacy.

In this sub-section, I will describe the self-assessment results of the three teachers for Strand 2 competence followed by my interpretation.

Table 5.5.2 Individual strands in comparison – Strand 2 (teacher survey 2, item 3.2)

S2. Recognizing learners' digital needs, abilities and practices and planning learning around the development of relevant digital skills.	Bee (B)	Sam (S)	Ning (N)
2.1 Understand the issues around learning in the digital age: digital exclusion / inclusion and equality of access.	2	3	4
2.2 Understand learners' digital needs, abilities and knowledge.	4	3	4
2.3 Take the knowledge of learners to guide teaching, learning and assessment.	4	4	4
Mean	**3.33**	**3.33**	**4.00**

Based on the teacher survey findings in Table 5.5.2, Bee and Sam rated themselves the same at 3.33. Ning was more confident in her abilities of understanding students' digital needs, so she rated herself as high at 4.

Bee

Bee understood her students' digital needs as she is a caring, sensible teacher. So her self-rating score at 4 was justified for me. This can be supported by her statements that she was aware that her students were naturally more skilled than she in using digital technologies as they were born in the digital age. However, she admitted that she lacked knowledge about digital exclusion and digital inclusivity based on her low score at 2 (B2.1 = 2).

Sam

Like Bee, Sam was not very confident about all digital issues in this strand, so he rated himself as average at 3.33. But he scored himself high at 4 for 2.3. This suggests that he believed he adopted a student-centered approach and he always responded to students' digital needs. He further suggested that students should learn more about using emails and Facebook messaging to communicate professionally in terms of business formality and ethics.

Ning

Ning recognized her students' digital abilities and needs that they enjoyed using technology. This is supported by students' increased motivation and confidence in learning through the iPad-based teaching approach. She also believed that students were more expert than she in using digital technology for searching information. Ning said, "they are Z generation and digital natives who know how to use digital tools to search and share information, create work, etc."

However, the previous findings about Ning's high underestimation of the students' digital technology use for academic purposes was opposed to her good score here. The survey results show that she did not really know what types of digital tools the students used for learning English. This indicates teachers' beliefs on students' learning styles and preference should have a valid proof, for example, the use of questionnaire surveys and interviews besides class observation for the best outcome of pedagogy.

In summary, Ning was the most confident for her good understanding of students' digital needs and skills and their learning strategies. However, no teachers clearly explained the digital issues around learning in the digital age in their report. Therefore, it is a good start to build teachers' knowledge in this strand.

5.5.3 Individual Strands in Comparison – Strand 3: All seemed knowledgeable but Ning outperformed.

In this sub-section, I will describe the self-assessment results of the three teachers for Strand 3 competence followed by my interpretation.

Table 5.5.3 Individual strands in comparison – Strand 3 (teacher survey 2, item 3.3)

S3. Selecting appropriate digital tools and using them creatively, critically and productively.	Bee (B)	Sam (S)	Ning (N)
3.1 Be willing to use digital technologies in professional practice and recognize best practices, legal, policy, safety and security concerns.	4	5	5
3.2 Teach creatively through interactive and engaging activities.	4	5	4
3.3 Understand the pedagogical theory around digital learning.	3	2	4
Mean	**3.67**	**4.00**	**4.33**

The teacher survey findings in Table 5.5.3 reveal that all three teachers felt confident in their abilities in selecting suitable digital tools for teaching. Ning believed she performed very well for this Strand 3 based on her high score (4.33).

Bee

Bee's average score was 3.67. Based on her reflective report findings, Bee reported that a digital tool must allow for better teaching and promote students' success. She believed that Kahoot games were used productively to facilitate students' learning and make them enjoy the class activities. Although she was not sure of the definitions of criticality and creativity when using the tools, I noticed that she carefully planned and designed good learning activities based on my class observation.

Sam

Sam's average score was high at 4. He reported that he was critical when he selected his teaching tools that must "firstly [have] ease of use and streamlining the learning experience". The Airplay mode on the iPad facilitated his teaching as he said he directed his explanation to the screen easily in the classroom.

However, I think he overestimated himself for being creative. As mentioned earlier, Sam did not implement a constructive design of learning environment besides using iTunes U, which is mandated for all faculty. Facebook was simply used to communicate with students for class management and assignment submission. As he claimed, “Good design is not a built-in computer function”, his teaching style was old-fashioned by writing notes on the whiteboard and clarifying the highlighted content with pictures from websites.

In addition, regarding his understanding of digital learning methodology for Strand 3.3, Sam did not report his use of digital tools to facilitate students’ learning. Rather, he said he observed the students use their digital devices to read digitally and highlighting PDF files. This indicates his limited understanding of digital tool affordances that can impede him from designing his pedagogical practices to become more creative and productive. So I think it is reasonable that he rated his ability for Strand 3.3 as low at 2.

Ning

Ning rated herself high at 4.33 which was reasonable for me. Based on the interview findings, she explored a wide variety of apps regarding their accessibility, ease of use, and viability. She said she was cautious and critical in selecting appropriate digital apps for her teaching. For example, she used to implement the Nearpod app a few years ago and stopped using it due to its complicated functions. But, she experimented with Nearpod again this year and found its functions improved and more practical for her class. Thus, she selected Nearpod as the main learning app in the class.

Ning said the students were more courageous to give comments, enjoyed sharing their ideas on the discussion forums of iTunes U and Nearpod. She said, “The results of self-evaluation students have to do after class showed that their remembering, understanding, applying,

analyzing, evaluation and creating are more than 70%".

In summary, Ning selected and used her teaching and learning tools creatively, critically, and productively, and she outperformed impressively Bee and Sam in this strand. Thus, Ning is suited to lead some teacher training in creating innovative technology-enhanced learning activities. In fact, all teachers should have high confidence in this strand as they are supposed to select effective learning resources and tools to develop students' knowledge.

5.5.4 Individual Strands in Comparison – Strand 4: Sam was the most knowledgeable.

In this sub-section, I will describe the self-assessment results of the three teachers for Strand 4 competence followed by my interpretation.

Table 5.5.4 Individual strands in comparison – Strand 4 (teacher survey 2, item 3.4)

S4. Developing your critical approach to digital information.	Bee (B)	Sam (S)	Ning (N)
4.1 Understand information literacies.	2	4	4
4.2 Distinguish between different types of digital information and media.	2	5	4
4.3 Search for, find, assess, use and apply digital information.	2	4	4
4.4 Actively seek out digital information to improve teaching.	2	4	4
Mean	**2**	**4.25**	**4**

Based on the teachers' self-assessment findings in Table 5.5.4, Sam was the most knowledgeable for the development of critical thinking skills and information literacies. Sam's average score was very high at 4.35 which is slightly above Ning's score (4), whereas Bee rated herself low at 2.

Bee

Bee accepted that she did not know about information literacy according to her low average score at 2. She said, "I am a novice in technological knowledge. I do not understand the term "information literary". However, to her limited understanding, she reported that she was aware of using digital information in a "thoughtful" manner. She understood that it was necessary to be

a technological expert first to become an information literate, with which I disagree. Information literacy and technological knowledge seem to overlap and blend into "digital literacies" that everyone can learn at all ages and any time.

Sam

Sam rated himself high at 4.25, which is the highest in the group. Based on my class observation, Sam expanded his sources to different types of digital information and teach students to be cautious about the authenticity of sources. He said he had good skills to navigate through digital secondary research: websites, blogs, PDF texts, books, and articles, and even all the photos and illustrations and use them as resources for writing his research article.

However, I have not seen him show his information literacy skills regarding a critical and informed judgment of the searching process strategy in finding, evaluating, and using the digital sources clearly in his teaching. Moreover, he used only a few sources from Google Search. Thus, it is not sensible to give himself a high score at 4.25.

Ning

Ning believed she had "quite good" information literacies (4) based on her high average score in the table above. However, in the report, she could not explain how she exercised critical thinking skills about digital information and media.

Based on the findings related to her digital practices, she rarely accessed digital information and communities. She was only engaged with learning how to use educational apps. Accordingly, I am skeptical about the strategy she claimed she used to develop her understanding about information literacy and critical thinking in finding, evaluating, and using different digital media. This suggests that she may assume searching online articles for her translation class proved that she had an informed judgment of using digital media critically.

Therefore, her high self-rated score was not justified for me.

In summary, Sam, an American teacher, was the most knowledgeable for information literacy and he had good critical thinking skills. It should be noted here that having been educated in Thai schools for over 20 years, I notice that criticality seems to be the most challenging skill for teachers in Thailand as they rarely practiced this ability when they were students. Becoming teachers, they may be accustomed to Thai education where teachers do not truly encourage students to ask questions and give comments. Many Thai students are not taught to think deeply and critically in order to give constructive feedback.

However, based on my observation, today young Thai children are more critical and inquisitive about the truth of the old knowledge due to the influence of social media and the affordance of updated resources online. I believe this is a good sign of teacher education reform in Thailand if Thai teachers are open to receive additional training in critical thinking skills and digital information literacy.

5.5.5 Individual Strands in Comparison – Strand 5: The most challenging issue for all three teachers.

In this sub-section, I will describe the self-assessment results of the three teachers for Strand 5 competence followed by my interpretation.

Table 5.5.5 Individual strands in comparison – Strand 5 (teacher survey 2, item 3.5)

S5. Forming and managing a professional digital identity and using it to engage professionally.	Bee (B)	Sam (S)	Ning (N)
5.1 Create a professional digital identity on social networks.	3	4	4
5.2 Critically understand and engaging with digital footprint, reputation and capital.	2	1	3
5.3 Actively create digital contents and share them in online communities.	2	4	3
5.4 Understand the significance of engagement in digital communities to non-virtual world.	2	3	3
Mean	**2.25**	**3.00**	**3.25**

Based on the teacher survey findings in Table 5.5.5, all teachers' average scores were just

about average (B = 2.25, S = 3, N = 3.25). This implies that the understanding and maintain digital identity was challenging for them.

Bee

Bee's average score for Strand 5 was 2.25. She said she mainly read the digital information and searched for videos and websites to find teaching materials. Thus, based on limited use of digital spaces, it is reasonable that she was not certain about her understanding of digital identity, digital footprint, and digital capital.

Sam

Sam gave himself an average score of 3. He claimed he was conscious of keeping his professional identity as a "family man, a teacher, a Yoga practitioner and a musician". He stressed, "I do think it is necessary to have a digital identity simply because modern communication is nearly impossible without it".

However, it is surprising that he rated very low at 1 for understanding of digital footprints. It is contrary to the previous results that he demonstrated his critical thinking about a digital "trail" and was very cautious of "self-censoring" before posting on Facebook. Also, he said, "I keep my online content family appropriate and public. I do not accept Friends I do not know", which indicates he knew the cost of unrepresentative identity that some of his Facebook friends unconsciously presented on Facebook. He told that he would think critically before sharing information online as he knew it was permanent.

Sam clearly demonstrated: "I prefer to keep mine small, clean and neat. I don't say anything online that I may regret later, which I think helps keep my reputation as a 'family man' as I have been told, and my pattern of social interactions on Facebook I think have helped me gain digital capital … from the Likes that I receive, that my Friends are satisfied with me".

Therefore, it is clear that Sam made an informed decision when creating a professional digital profile. Moreover, the aforementioned findings supported that his digital identity was purposefully representative to showcase what he wanted people to see. Moreover, I believe he was aware that his private digital footprints were monitored by Facebook, but he accepted it. Overall, I think he underrated his knowledge and should earn a high average score of 4.

Ning

Ning recognized her weakness of creating a digital identity and engaging with digital communities based on her average self-rated score (3.25). She simply wrote in the report that she had her digital identity as "a lecturer who teaches English and Translation and uses education technologies in classroom". She concluded, "I think it's unnecessary to have a digital identity in online society if you're a real professional".

Her reflective report also reveals that she was concerned with the security and safety of her digital profile. She said the digital profile might be unprofessionally misused as "everyone can access your information and use it illegally". This implies why she seldom or never used social media for academic and non-academic purposes. In addition, like Bee, she confessed that she had no ideas regarding digital footprint, digital reputation, and digital capital. As a result, her rating score was 3.25.

I think I understand Ning's personal preference for not socializing on social networks; nevertheless, Ning's digital exclusion might make her lose good opportunities to expand her technological knowledge. If she knows how to manage and disseminate her talents and achievement not only through her professional training of other teachers, but also through her engagement in social media, this can be beneficial to showcase her expertise and motivate other teachers to seek her advice and finally form a community of practice.

In summary, engaging a digital professional identity can be tiring; however, I think Sam was the most knowledgeable for this strand. Knowing how Sam formed and engaged his professional digital identity is valuable for teachers and students to learn from him. Because almost everyone uses social media at present, it is important that teachers should have digital literacy skills and knowledge about the impact of digital identity, digital footprints, and digital capital to educate themselves and students.

5.5.6 Individual Strands in Comparison – Strand 6: Ning was the expert.

In this sub-section, I will describe the self-assessment results of the three teachers for Strand 6 competence followed by my interpretation.

Table 5.5.6 Individual strands in comparison – Strand 6 (teacher survey 2, item 3.6)

S6. Understanding and leading on digital safety, security, ethical and legal responsibilities and citizenship.	**Bee (B)**	**Sam (S)**	**Ning (N)**
6.1 Understand legal responsibilities to learners and apply this to own practice (e.g., cyberbullying and inappropriate conduct online).	3	5	5
6.2 Understand how equality and diversity, and standards, legislation and local policies apply to digital environment.	3	4	5
6.3 Understand own legal, ethical and professional rights and responsibilities when using, creating and publishing digital content (e.g., copyright, plagiarism and acknowledgement of sources)	3	5	5
6.4 Understand the definitions of digital citizenship and recognize the rights and responsibilities.	2	3	5
6.5 Understand how actions online can have real-world significance.	3	5	5
Mean	**2.80**	**4.40**	**5.00**

The teacher survey findings in Table 5.5.6 show that Ning was the most competent in understanding digital safety and security based on her full score (N = 5). Sam was also confident in his knowledge for this strand (S = 4.40) especially legal rights when using digital content. Bee's competence for this strand was lower than others (B = 2.80).

Bee

Bee's average score (2.80) indicates that she had sufficient understanding about digital safety

and security. She reported that she had not been cyberbullied, but she was careful of this issue. She said, “I am aware of sharing and using online information as much as I can”. But without good understanding of digital rights and legal responsibilities, she said she was not certain whether her digital practice was appropriate. This implies that Bee was very sensible and cautious about her self-assessment and did not want to overrate her knowledge if she was not confident. This can support my interpretation that Bee is a “thoughtful player”.

Sam

Sam estimated his knowledge and skills of digital safety and security high at 4.40. However, he did not give clear explanation about the copyrights and legal responsibilities on digital usage. From the report findings, he presented his concern and criticality about his professional activities when using digital spaces. He had his personal mantra for his digital comments: “If you don’t have something nice to say, don’t say anything” that I think created harmony and support He said he chose to ignore any conflicts among his Facebook friends and disregarded inappropriate posts of students because he thought it was not his right to stop them. This evidence can support my analysis about Sam that he is a “cautious facilitator”.

Ning

Ning was very confident about her knowledge and understanding of this strand according to her full score of 5 for each item. She took responsibility of her professional conduct as a teacher and suggests, “we should not post anything negative or devastate our students”. She said she did not worry about digital unsafety and insecurity and she has never been cyberbullied. But, she said she was also afraid of the inappropriate use of her digital photos and content. She recommended that the Intellectual Property Office of Thailand should enforce a strong copyright act to protect online users from criminal misuse.

In summary, Ning was confident about her knowledge around copyrights and legal responsibilities and concerned about her digital safety. This may explain why she did not post on Facebook or use other social media for her teaching and personal matters. I believe it is important that teachers should gain a great deal of deep understanding in this strand in order to warn their students to use digital information lawfully and professionally.

5.5.7 Individual Strands in Comparison – Strand 7: Ning aimed high for her technological professional development.

In this sub-section, I will describe the self-assessment results of the three teachers for Strand 7 competence followed by my interpretation.

Table 5.5.7 Individual strands in comparison – Strand 7 (teacher survey 2, item 3.7)

S7. Planning for continuous professional development and tracking digital trends.	Bee (B)	Sam (S)	Ning (N)
7.1 Reflect critically on digital experiences for future development.	3	4	4
7.2 Monitor future digital trends.	3	3	4
7.3 Use new digital tools to improve own knowledge and skills.	3	3	5
7.4 Use appropriate tools for reflection.	3	3	4
Mean	**3.00**	**3.25**	**4.25**

The teacher survey findings in Table 5.5.7 show that the three teachers gave themselves a good score, especially Ning who had high ambition to develop her teaching professionalism (N = 4.25).

Bee

Bee's average score (3) indicates that Bee was interested in experimenting with online games, which addressed students' need and developed their writing skills and knowledge in English. She knew it was necessary to facilitate her class management and engage students in learning in the digital age. So, she planned to follow new digital trends.

However, Bee was not very certain about her professional development plans of promoting digital literacy. She did not believe technology would be entirely essential for English learning as it was just an add-on teaching tool to make the class fun. She did not want to rely on technology. Also, she highlighted that technology could not always be reliable.

Bee concluded that she was a novice and definitely not yet "a digitally literate teacher".

Sam

Sam rated himself slightly above average at 3.25. He was confident in taking a critical approach and reflection on his digital usage for future development of professionalism in digital literacy. He believed he should develop his digital literacies and update himself about new digital trends because "students have to be educated on the smart and critical ways to search on the Internet, engage in social media, and discern real news from fake news".

However, he was not dependent on new technology because he was "too busy" covering five classes and had no time allocated to explore digital tools. He acknowledged,

"I am not a highly advanced digitally literate professional when it comes to a comprehensive knowledge of the technology and the digital pedagogy; I am digitally literate up to the point where my needs end". He was making sure that he was following the university policy by using iTunes U.

Ning

Based on Ning's high rate of 4.25 for Strand 7, Ning was ambitious to pursue her professional goal as "a trainer for using education technologies in all platforms". She was also prepared for improving her teaching methods by incorporating digital technologies and changing her teaching role to be "a facilitator not a traditional lecturer".

She was very positive that she wanted to change some faculties' misperception that using

technology was difficult. She said, “I believe everyone can be a digitally literate professional if he / she knows how to use them [technologies]”.

She also believed she was a digitally literate teacher. She usually followed the updates of new learning apps and tools from the Apple Regional Training Center of the university. This suggests why Ning was well-informed in digital literacy concepts. Ning valued the importance of developing students’ digital literacy because it was necessary in 21st century to deliver innovative teaching with technology integration. She insisted that teachers should support students to use technology in and outside the class to make students motivated in learning and to enhance their creativity. She restated, “We can’t teach students in a traditional way because students will feel bored and their creativities will be blocked. There are many things students can learn outside the class so using digital tools and technologies will support their learning”.

However, based on her high score of 4 for monitoring future technological updates, I am curious how she would learn new trends of technologies efficiently because of her detachment from engaging in digital platforms.

In summary, Bee and Sam believed technology was not the main tool for their teaching; thus, they were not very eager to develop their digital literacies. Bee did not want to rely on technology whereas Sam was too busy to explore the usefulness of new technology. In contrast, Ning viewed technology was the key for her teaching.

It should be noted that Ning’s open-mindedness and positive attitude toward digital literacies were hardly seen among experienced senior teachers around her age. Thus, her model can affirm the importance of being open, willing and adaptable for change to become a digitally literate practitioner to manage the rapid advancement of technology and new learning behaviors of the young digital generation.

5.5.8 A Summary of the Teachers' DLT Findings and Interpretations

In this sub-section, I will summarize the three teachers' self-assessment survey results for all seven strands of the DLT framework followed by my interpretation.

Table 5.5.8 A summary of all 7 strands of DLT framework in comparison

7 Strands of DLT framework	Bee (B)	Sam (S)	Ning (N)
Strand 1: Understanding your own position as a digitally literate teacher and the relationship between skills and practice.	3.00	3.50	5.00
Strand 2: Recognizing learners' digital needs, abilities and practices and planning learning around the development of relevant digital skills.	3.33	3.33	4.00
Strand 3: Selecting appropriate digital tools and using them creatively, critically and productively.	3.67	4.00	4.33
Strand 4: Developing a critical approach to digital information.	2.00	4.25	4.00
Strand 5: Forming and managing a professional digital identity and using it to engage professionally.	2.25	3.00	3.25
Strand 6: Understanding and leading on digital safety, security, ethical and legal responsibilities and citizenship.	2.80	4.40	5.00
Strand 7: Planning for continuous professional development and tracking digital trends.	3.00	3.25	4.25
Mean	**2.80**	**3.68**	**4.26**

Bee

Among all seven DLT strands, Bee felt most confident in Strand 3 regarding the ability of selecting digital tools (S3 = 3.67). Bee was confident in her creativity in designing learning activities and using gamified tasks on the Kahoot app to measure students' understanding. Moreover, Bee believed she knew her students' needs to some extent (S2 = 3.33) and had capacity to plan a learning activity to suit their wants and needs. On the contrary, Bee assessed her critical thinking low (S4 = 2.00) when she had to evaluate digital information. She realized that she had limited understanding in creating her professional digital identity (S4 = 2.25). This may be because she rarely engaged in social media and digital communities, so she was uncertain about her role in the online world.

Sam

Sam's overall evaluation score was roughly high at 3.68 although he acknowledged he was not a digitally literate teacher. He was very assured of his skills of being conscious about digital safety, his digital responsibility, and his criticism in online communities (S6 = 4.40).
He also believed in his competence in developing a critical approach to digital information (S4 = 4.25). He said he had developed his expertise as an English literature educator and had experience in teaching English from Media several times.

The weakest aspects that Sam considered for himself were in Strand 5, associated with creating a digital identity and actively engaging in digital communities (S5 = 3). It may be because Sam was not very interested in regularly participating in digital communities to establish a new digital identity and to share information and opinion in digital spaces.

Ning

Ning was the most confident in this group about her competence in digital literacies (4.26). Ning performed best in understanding the role and responsibilities of being digitally literate (N1 = 5) in using iPads and classroom apps. Also, she believed in her competence (N6 = 5), which focuses on understanding digital security, ethical, legal rights, and digital citizenship. Generally, she outperformed to a high extent in almost every strand except Strand 5 (N5 = 3.25) regarding maintaining her professional digital identity. This may be because she seldom used social media and did not want to establish a personal digital identity.

In summary, Bee's self-rated DLT average score (B-DLT = 2.8) was much lower than Sam and Ning. Sam was in the middle of the group for his good score (S-DLT = 3.68). Sam scored higher than Ning only about developing a critical approach (S = 4.25, N = 4.0). Ning was the most confident about her understanding of digital literacies (N-DLT = 4.26).

Despite a great amount of time consumed in acquiring digital literacy skills to successfully integrate technology for teaching, Ning was the most determined in comparison to Bee and Sam to develop her professionalism to become a digitally literate teacher and technology trainer. Ning's example should make teachers aware of the importance of technology and digital literacy integration into curriculum, and that it requires a great understanding of technology affordance and limitation, as well as the passion and endeavor of technology trainees. They need to invest their time to learn technology to some extent, which is often complex and unreliable.

5.6 A Summary of the Overall Findings and Interpretations

This study's main goal is to raise awareness of teachers to find value in digital literacy development for themselves and their students for their optimal learning outcome. New proactive teachers should be willing and open to adopt a new, creative teaching practice afforded by emerging digital technologies and social media.

To address the problem that English language teachers in Thailand are not involving digital technology into teaching as expected and mandated, the study's objectives are to assess teachers' digital literacies and explore their perceptions about technology integration into curricula. In addition, this study offered various digital technological resources that can be used to improve digital literacy for teachers.

In this section, the summary of the overall findings and my interpretation are divided into five sub-sections as follows:

5.6.1. Digital Technology Use of Teachers and Students for Academic and Non-academic Purposes

Both teachers and students used digital technologies and social media for non-academic purposes more often than for academic purposes. The students used a number of technologies and social media both for academic and non-academic purposes more than their teachers.

For academic use, the students' favorite digital tools were YouTube and mobile apps, whereas the teachers' most popular technologies were websites and YouTube. For non-academic purposes, both groups enjoyed searching on websites the most and watching YouTube videos. The students also frequently used mobile apps and played online games. They became more interested in Instagram and Twitter. Interestingly, teachers mostly relied on Facebook and LINE and they used LINE more often than students. Teachers seldom used Instagram and Twitter or played online games.

Regarding the three focal teachers' technology use for academic purposes, they always applied websites into their teaching. Bee and Sam also used YouTube videos whereas Ning was more interested in using iTunes U courses and iPads. Sam used technologies and social media the most for both academic and non-academic purposes. For non-academic purposes, the three teachers had the same high preference for using Facebook. Sam and Bee also enjoyed reading on the websites and watching YouTube videos. But, Ning did not like to use technologies and social media for fun.

The findings may suggest that students seem to value technology affordance more than their teachers, and they enjoyed using social media for their English learning development.

5.6.2 Teachers' Perceptions of Students' Digital Technology Use for Academic and Non-academic Purposes

The teacher group underestimated students' digital technology use for academic purposes for almost all social tools. The biggest mismatch between teachers' perceptions and students' technology use for academic purposes was the use of emails. In fact, students often communicated with teachers and classmates through Facebook and LINE. Conversely, the teachers overestimated the students' technology use for non-academic purposes for five types of technology: Skype, emails, Facebook, LINE, and online games.

Like the teacher group, for academic purposes Bee and Ning underestimated the students' digital technology use, but Sam highly overestimated the students' use. For non-academic purposes, Bee overestimated the students' technology use, but Ning underestimated their use. Sam's perceptions on the students' use was very close to the students' technology use.

It is clear that the teachers had some wrong perceptions of what technologies the students used for living and learning. Thus, a good understanding of students' learning style is beneficial for teachers to create constructive learning environment to serve the students' needs and wants for optimal learning and teaching efficiency.

5.6.3 The Perceptions of Students and Teachers about Technology Integration into Curricula

The students believed they had more expertise and confidence in web-searching skills and their technical skills for using digital tools and social media than their teachers. But they were aware that the teachers knew a number of good digital tools for learning proficiency development. All students believed that digital technology should be integrated into English curricula because it facilitated their learning and made the class more enjoyable and engaging.

The majority of students said it is essential to acquire digital literacies to help them wisely access, select, and manage the gigantic resources in cyberspace.

Many teachers believe that technology increased students' motivation in their class participation. They were satisfied with the university's policies regarding technology integration into pedagogy. But they were not confident about the potential of taking an online exam on iPads because they were concerned with the unreliability of the Internet connection of the university.

The teachers also reported that their limited technology skills and the insufficient time for class preparation because of overloaded teaching and responsibilities were the biggest obstacles in incorporating technology into classrooms. Almost 50% of the teachers were interested in receiving more technological formal training.

In addition, students' low English proficiency and the unreliability of technology were the barriers of many teachers for technology integration. Some teachers were worried that students would be distracted when technology was integrated into learning and teaching.

Bee, Sam and Ning felt positive with technology integration and found technology useful for both teachers and students. Bee thought YouTube videos offered rich teaching resources that were useful for her pedagogy. Technology also saved time for class preparation and was valuable for students to use for extra practice to develop their English skills outside the class. Sam believed technology was another important tool for teaching. He used PowerPoint slides, websites, and Facebook mainly for his instruction. Ning was highly motivated in implementing mobile apps into her teaching as she believed technology improved her own teaching method to be more constructive and broaden students' knowledge and learning in the digital age.

In summary, most teachers were positive about technology integration into instruction, but it requires sufficient time to build and enhance the digital literacy skills of teachers, not to mention

the dedication to make technology-enhanced language learning and teaching become productive and successful.

5.6.4 Teachers' Technology Application into Curricula and Their Digital Literacies

In this section, the teachers' application of technology and their digital literacy skills will be presented in three sub-sections as follows:

5.6.4.1 Teachers' Technology Application into Curricula

The teacher survey findings reveal that digital technology was primarily integrated into class as a useful tool for communicating, facilitating instruction, and searching for learning resources. Eighty percent of the teachers applied an iPad into their curricula. However, teachers did not extensively integrate iPad-enhanced language teaching as expected. But they reported that they encouraged students to use iPads to access iTunes U courses to study learning materials before the class and use them for exam review. Most teachers used iTunes U courses to only comply with the university's iHybrid learning system based on my observation. The teachers uploaded learning and teaching materials and supplementary online links to the iTunes U platform for students' self-learning outside the class.

But only seven teachers used it in the class for creating class presentations via Airdrop mode, searching to illustrate class contents, accessing iTunes U course, and using some mobile apps on the iPad.

In Bee's fundamental English class, she always opened with amusing YouTube videos about teaching English, and created gamified activities to motivate students in learning and help them review the lessons. Sam mainly used online materials and PowerPoint slides for reference and ideas sharing with his English from Media students and for exam review. Sam liked to contact his students through Facebook as it was quick to reach them. Ning's English Translation class

was augmented by iPads and many digital tools, such as iTunes U, the Nearpod app, dictionary online apps, websites, and Google Docs. This was an engaging, collaborative class where the teacher and students used iPads for teaching and learning in and outside the class.

5.6.4.2 Teachers' Understanding of Digital Literacy Concept

The teacher and student surveys reveal that the teachers knew and understood about digital literacy skills and issues less than the students. The teachers believed digital literacy was useful to afford students' autonomous learning in the digital age and it should be infused in English curricula. However, about 30% of the teachers thought it was unnecessary as the students were now already skillful in using digital technologies.

It should be repeated here that despite the fact that students were more confident about using technology, most still wanted to learn more deeply about digital literacy skills and issues from their teachers.

5.6.4.3 The Three Teachers' Digital Literacy Competence Informed by TPACK-DLT Frameworks

Bee was the least confident for her TPACK based on her lowest score (3.48 of 5) in comparison to Sam and Ning. Bee believed in her strong proficiency in content knowledge (CK), pedagogical knowledge (PK), and technological pedagogical knowledge (TPK). She was aware that she needed to develop technology components. Referring to Bee's digital literacies guided by DLT principles, her lowest score (2.80) compared to the others indicates that she was not very confident in her competence in digital literacies. She also admitted that she did not understand most of the digital literacy concepts.

Sam's TPACK score was 3.97. He was most confident in CK and PK, but he was aware of his low performance in technological knowledge (TK) and technological content knowledge (TCK).

Regarding Sam's DLT scores, he rated himself high at 3.68, but he thought he was not yet digitally literate. Sam was very confident in his understanding of digital safety, ethical rights, and digital citizenship and developing a critical approach to digital information.

Ning was the most competent and knowledgeable in all seven components of TPACK, and her self-rated score was highest among the group of three (4.23). She was the most self-assured in her TPK, PK, and TPACK. Ning thought she was weakest in TK. Referring to DLT scores, Ning was the most confident among the three teachers about her digital literacies (4.26). She believed she had great understanding on digital safety, security, ethical and legal responsibilities, and digital citizenship. She recognized her lower skills and understanding about creating a professional digital identity.

Obviously, Bee, Sam and Ning are outstanding in several areas in that they themselves could become technology trainers. On the other hand, their weaknesses in digital literacy skills and lack of understanding of specific digital issues can be useful information for teacher educators to arrange technology workshops for specific purposes and interest groups.

5.6.5. Teachers' Evaluation of Digital Web 2.0 Technology-enhanced Activities in Improving Digital Literacy Skills

The teachers' average group score for all digital web 2.0 technology-enhanced activities is 3.36. Most teachers preferred to receive assistance from a technology mentor to improve digital literacies. They were also interested in creating YouTube videos and teacher websites.

Bee and Ning supported that having a technology mentor was the best strategy to improve digital literacy skills as it was a quicker shortcut to learn new technology skills. In contrast, Sam preferred creating a Facebook page and a LINE group most as it is convenient for communication and sharing technological knowledge.

Today, digital literacies are now widely recognized as essential survival skills in managing ICTs, living, communicating, and teaching and learning in the 21st century. Therefore, it is crucial that teachers should integrate digital literacy skills and technological knowledge into their instruction to improve themselves and their students to become digitally literate professionals.

CHAPTER 6: CONCLUSION AND IMPLICATIONS

In this dissertation, I have assessed the digital literacy of in-service English language teachers in Thailand and have explored their digital technology use and perceptions of technology-enhanced language teaching and learning. In addition, the students' digital technology use and their perspectives of digital technology integration into curricula were investigated. The purposes of this dissertation project are to address the problems of teachers in Thailand who have not integrated digital technologies into their curricula as is expected and mandated by Thai educational policy.

The ultimate goal is not simply to raise the awareness of teachers of the importance of digital literacy in language teaching and learning, but to offer digital technological resources to promote their digital literacy for professional growth. In consequence, the teachers will become digitally literate professionals who may further foster students' digital literacy development for their own self-regulated learning in the evolving age of digital tools and social media.

Through triangulated data collection from the teacher and student surveys, teacher interviews, student focus group discussions, class observations and teaching artifacts, the five research questions were answered thoroughly. The study addressed the issues of digital technology use, teachers' perceptions of students' technology use, the perceptions of teachers and students of technology integration into curricula, teachers' application of technology into teaching, and teachers' digital literacies and their digital literacy development plans.

In the previous Chapter 4, I described the comprehensive results and interpretation of the perspectives of in-service English language teachers and students about digital literacy and technology integration into curricula. There were eight main sections including student aggregate results and teacher aggregate results.

In the previous Chapter 5, I presented the individual profiles of Bee, Sam, and Ning, and their digital literacies informed by TPACK-DLT frameworks as well as a summary of the overall findings. The complete results have provided empirical evidence that contributes to the research on teachers' digital literacy in Thailand.

In this chapter, I will first discuss the prominent findings that relate to the relevant literature to offer new visions of the research on digital literacy and teacher education. Then I will describe the implications, limitations of the study, the contributions of the study, and directions for future research. Finally, I will conclude the dissertation project with final thoughts. As a result, this chapter will be divided into six sections as follows:

6.1 Discussion

In this section, I will discuss the findings and analysis based on the five research questions of this study in light of the relevant literature. There will be six main topics as follows:

6.1.6 Teachers' digital literacy informed by TPACK assessment and the proposal of DPACK framework

6.1.1 Digital Technology Use for Academic and Non-academic Purposes

In this study, the analysis of teachers' and students' digital technology use shows that students in generation Z who were brought up with technology are more comfortable with digital devices and use various technological tools and social media more often than the teachers of generation X. It was also found that students are better at multitasking on digital devices. The students admitted that they were very addicted to social digital platforms and devices; one said, "I can't live without it (smartphone)".

The teachers mainly used websites and YouTube videos as resources for teaching while students learned English from broader various sources, such as YouTube, mobile apps, iTunes U courses, and Facebook. In informal contexts, teachers and students shared similar preferences of digital technology use. They both enjoyed surfing websites, watching YouTube video clips, and using LINE and Facebook. However, students were more experienced with digital technologies and social media. They were more interested in mobile apps, online games, Instagram, Twitter, blogs, and wikis.

The study confirms Roblyer et al.'s (2010) findings that teachers preferred emails to Facebook. This study reveals that the teachers used emails most, then LINE and Facebook for communication for academic purposes. However, in this study, the teachers used Facebook for out-of-class communication. Thus, Facebook did not foster class discussions in contrast to the findings of Suthiwartnarueput and Wasanasomsithi (2012).

Moreover, this study supports Roblyer et al. (2010) that students like to use Facebook to learn and communicate with teachers. However, they also used LINE, Instagram, and Twitter for

academic purposes. The students also felt positive towards Facebook, as confirmed in the findings of Reinhardt and Zander (2011) and Wang and Vasquez (2014). This study also supports the potential of LINE as described in Van De Bogart (2014) as a collaborative tool between teachers and students. In contrast to Reinhardt and Zander's (2011) results, however, the students did not like the traditional teaching style anymore. They preferred teachers to incorporate engaging technology-enhanced learning activities in the class.

6.1.2 Teachers' Perceptions of Students' Digital Technology Use

This study's findings reveal that some teachers taught in a traditional lecture-based style with chalkboard, whiteboard, or PowerPoint slides. I think it is acceptable as long as the teachers do not expect students to learn the same traditional way, such as only using textbooks, listening to the lectures, and taking notes. According to the student discussion findings, some teachers did not allow students to use technology in the classroom, which made them feel bored and uncomfortable. The students stressed that they wanted to surf the Internet while learning in the class. They said they could find good sources of knowledge from YouTube videos to make them better understand the subject content. The students reported their discomfort about not being permitted to use technology in the class to the teachers, as well as the teachers not responding to their request.

A similar situation also happened in Ning's class. Based on the student group discussion results, the students asked Ning to inform them of details about weekly assignments in the class for convenience and clarification. But Ning refused and insisted on posting the assignments on the iTunes U course. The teacher told them to be responsible. Moreover, based on the interview findings with Ning, she used to decline the students' requests regarding preparing for them paper-based or PDF-formatted reading materials, rather than E-books. The anecdotal evidence

suggests the unlikelihood of Thai teachers taking suggestions from students because of the hierarchical culture of Thailand. However, the students confirmed that younger teachers were more likely to listen to them.

Furthermore, in this study the teachers' underestimation of students' digital technology use for academic purposes requires attention. The teachers should be open-minded to understand the new learning styles of the younger generation Z who are more familiar with self-learning afforded by social media and digital tools. More importantly, the teachers' overestimation about students' technology use, especially of Skype, LINE, Facebook, and online games for non-academic purposes, implies that teachers assumed that students mostly used digital technology for fun.

Therefore, this study confirms a number of studies for the leverage of social media in L2 teaching and learning (Anderson, 2007; Blake, 2016; Chen, 2013; Chun et al. (2016); Hafner, 2013; Kern, 2008; Kessler, 2013b; Lotherington & Jenson, 2011; Mills, 2011; Roblyer et al., 2010). It is believed that today's students have preference for and potential in using social media and web 2.0 technologies to enhance their learning, and the teachers should design creative learning activities with the use of social media. I think if teachers can apply the technologies that students are familiar with, such as Facebook, Instagram and Twitter, into class activities, they will feel confident and find the lessons more engaging and become motivated in learning.

Thus, I would like to call for a better understanding of teachers by valuing the affordance of digital technologies and especially social media for language learning and teaching. Also, the teachers should be more aware of integrating digital literacy for teaching and learning. I recommend teachers conduct a needs analysis of students' digital technology use in the first week of any given semester to explore what technologies they want to use for learning and how

they can be incorporated into the class to promote better learning outcomes and teaching approaches.

6.1.3 The Perceptions of Teachers and Students about Technology Integration into Curricula

This study reveals that the teachers and students' attitudes towards technology integration were positive, and they realized the value of technology integration into the class. I will discuss the findings in three aspects as follows:

6.1.3.1 Students' perceptions of teachers' technology integration

6.1.3.2 Teachers' integration of technology: hurdles and suggestions

6.1.3.3 Affordances and drawbacks of iPad-enhanced language teaching

6.1.3.1 Students' Perceptions of Teachers' Technology Integration

The student aggregate findings reveal that all students supported the leverage of social media and digital technology in teaching and learning as they are authentic, useful resources and make learning activities more engaging and meaningful. The students raised an important issue that they knew how to use new technological tools better than the teachers. The students were also aware of teachers' difficulties in coping with emerging digital technologies and social media. They understood that the teachers might not use them as often as they themselves did. Although the students did not expect their teachers to be technology savvy, they wanted the teachers to be skillful in operating the classroom technologies, such as iTunes U and iPads or a desktop computer, for smooth and productive instruction.

Moreover, the students insisted that they needed to be trained in digital literacy in the class. So they recommended that the teachers take technological training to develop their digital literacy skills. They wanted the teachers to give guidance of what learning apps and digital tools

were essential and useful for developing their English learning for self-regulated learning. The students also preferred to learn critical thinking skills for distinguishing real from fake news from teachers as they believed teachers were more critical, logical, and professional.

Thus, the students' call for digital literacy training is important for teachers to consider. It is worth noting that the student findings in this study support Dudeney et al.'s (2013) argument that students still need teachers' guidance about technology use. However, this study slightly differs in that students in generation Z can research and teach themselves about using technology.

6.1.3.2 Teachers' Integration of Technology: Hurdles and Suggestions

This study supports Koehler and Mishra's (2009) statement that it is challenging to teach well with technology. Even though this study was conducted in 2018, the age of digital technologies, some teachers still preferred print literacy as described in the study of Tan and McWilliam (2009). The study findings imply that many Thai teachers were not confident to integrate technology in the class and thought digital technologies were too difficult and overwhelming. This common hurdle coexists in the studies of Hutchison and Reinking (2011), Prensky (2001), and Tan and McWilliam (2009). It should be noted, however, that the teachers' problems of using technology still occurs a decade and more later in 2018 in spite of it now being the digital age where learning to use technology has become easier and more accessible through websites and YouTube videos. In addition, Chun et al.'s (2016) report about teachers' challenge to select appropriate digital tools to teach students is similarly found in the results of Sam.

This study also reconfirms the claim of Jivaketu (2015) that Thai teachers were reluctant to incorporate technology into their teaching. While most Thai teachers in this study claimed technology unreliability and Internet connectivity were their big barriers, Pang et al. (2015) found that Korean teachers did not see the difficulties of Internet access as barriers to integrate

technologies into their teaching. This implies that teachers' attitudes of being willing to change and being tolerant of technical problems are crucial. The results also suggest the low-risk-taking aspect of Thai culture. Thai teachers tend to be conservative and not very interested in experimenting with new strategies of teaching.

Based on my observations as an experienced teacher, Thai female teachers who teach languages mostly have low-risk-taking characteristics. They feel comfortable with their old teaching routines and do not like changes. In addition, as Thai teachers do not earn high income but work hard, they may feel they do not want to have new responsibilities, such as adjusting their teaching methods and adopting new technology into their pedagogy. Thus, this study confirms Loveless and Williamson's (2013) study that teachers should be willing to adopt new teaching with technology integration to respond to the students' needs. This study also supports Van De Bogart (2012) that teachers need to be familiar with using digital technology and change the course evaluation to be more creative. In addition, the findings that the teachers encountered many difficulties in applying technologies and needed additional technology training compare to those in the studies of Blake (2016); Dudeney et al. (2013); Hague and Payton (2010); Hutchison and Reinking (2011); Nguyen, Barton and Nguyen (2015); Pang et al. (2015), and Tan and McWilliam (2009).

However, saying is easier than doing according to the statement of one of the UTCC administrators because the teachers still did not manage their time to attend the workshops as expected. They claimed they had too much teaching and class preparation. The findings of this study about complaints of limited class preparation time support Khamkhien's (2012) findings that teaching overload was the major barrier for technology integration into classrooms in Thailand.

6.1.3.3 Affordances and Drawbacks of iPad-enhanced Language Teaching

Previous studies (Hafner, 2013; Kessler, 2013b) show it was crucial to incorporate technologies to leverage pedagogical practices. That finding resonates in this study in that students thought that technology helped them easily access hypertext and multimedia online sources for their English listening and writing development.

The iPad application into the teaching of Ning, one of the focal teachers in this study, can confirm the statement of Johnson et al. (2015) regarding the prevalent emergence of "Bring Your Own Device" (BYOD) into curricula. Similarly, using iPads in the class or the BYOD approach can improve students' engagement and understanding in learning by creating access to rich online resources that can support their understanding. Moreover, the affordance of iPad-enhanced pedagogy in this study reaffirms the constructive results of research on mobile technologies in developing teaching strategies (Riley, 2013; Rostami et al., 2017), improving students' motivation and creating positive attitude in learning (Gikas & Grant, 2013; Hwang & Chang, 2011, 2015; Martin & Ertzberger, 2013; Militaru et al., 2015; Rostami et al., 2017; Sandberg et al., 2011; Saran et al., 2008; Theerathean & Srikulwong, 2015; Wang et al., 2015; Xu et al., 2017).

Consistent with the studies of Hwang and Chang (2011), Kukulska-Hulme (2009), Melhuish and Falloon (2010), and Riley (2013), this study reports the mobility and convenience of using iPads for teaching and learning. The findings of this study additionally support the studies of Cochrane et al. (2013), Hargis et al. (2014), Hutchison et al. (2012), Melhuish and Falloon (2010), Rossing et al. (2012), and Smith (2008) regarding the potential of iPads in facilitating group work dynamics and collaboration. For example, in this study, Ning reported that her students were more confident in giving peer feedback on translation work via the Nearpod app

on the iPad. The students were also more motivated in learning, similar to the findings of Perez et al. (2011) and Theerathean and Srikulwong (2015). Likewise, in this study iPads provided authentic learning resources, as found in Hargis et al. (2014), Riley (2013), Rossing et al. (2012), and Van Orden (2006).

Similar to Culén and Gasparini's (2011) issue of iPad ownership, the students were worried about losing their iPad given by the university and paying some compensation. It is the university's policy that the students will entirely own an iPad provided by the university when they finish their Bachelor's degree from the university. In this study, the findings about the students' novelty distraction because of digital technologies match with the previous studies of Culén and Gasparini (2011), Gikas and Grant (2013), Martin and Ertzberger (2013), and Rossing et al. (2012).

However, this study does not indicate the students' creativity development through the use of iPad-enhanced learning and teaching as in several studies (Cochrane et al., 2013; Kim et al., 2016; Melhuish & Falloon, 2010). In addition, in this study the students did not discuss the iPad usage problems of note-taking features, time consumption of loading webpages, and lack of Flash support found in Culén and Gasparini (2011). In addition, unlike the studies of Hutchison et al. (2012) and Archibald et al. (2014), the students in this study did not find difficulties in resizing texts and images and controlling the sensitivity of the touchscreen. This implies that the younger generations or generation Z are more comfortable with using digital technologies. On the other hand, Sam, a focal teacher in this study, reported his problem of using the touchscreen on iPads when keying information.

6.1.4 Digital Technological Resources for Teachers' Digital Literacy Development

This study's finding that teachers found it beneficial to have a mentor for seeking advice about technological usage is also found in several previous studies (Childress, 2014; Haydn & Barton, 2007; Kay, 2006; Sukso, 2015; Tondeur et al., 2012). In addition, the finding is supported by Ning, a technological training teacher who observed that some teachers were able to apply iTunes U course into their teaching after gaining technological assistance from her. This evidence also affirmed my correct presumption that technological mentoring will be useful for in-service teachers.

According to the teachers' evaluation of the efficacy of various digital technological resources, the teachers liked to create a YouTube video project more than a teacher website and a digital story. The teachers' interest in digital stories to develop digital literacies aligns with the positive perceptions of advanced English students for digital storytelling projects in Oskoz and Elola's (2014) study. On the other hand, creating a Twitter feed and a teacher's blog received the least attention from the teachers. Likewise, this unpopularity of blogging is discussed in Lakarnchua and Wasanasomsithi's (2013) findings about the Thai students' slightly negative attitude toward using blogs.

Based on my direct experience in creating a digital story, I think it would be helpful to design a workshop of digital storytelling for teachers to develop their digital literacy. Thus, I would like to offer an example of the lesson plan of creating a digital story presented in Appendix I.

6.1.5 Digital Literacy Instruction

The findings of this study reveal that most teachers and students believe digital literacy instruction is necessary to be integrated into curricula. It is disappointing, however, that Thai teachers of English have not broadly understood digital literacies. They only focused on the

"functional skills" of managing digital tools that it is one of the eight elements of digital literacies based on Payton and Hague (2010). Furthermore, based on the DLT framework (White, 2015), the findings reveal that teachers did not have a good understanding of the issues and knowledge around digital literacy. Thus, the teachers were conscious of their low digital literacy skills; they believed their students were more skillful in using technologies, and their perception is correct. In this study, the students were able to describe the skills and issues of digital literacies better. They can understood the characteristics of being a "digitally literate person" (White, 2015) as being critical, creative, and confident to compose digital content and give constructive comments in digital communities. This finding is similar to that of Dudeney et al.'s (2013) study that teachers were less competent than their students about the digital technologies.

The call for teachers' awareness to develop their digital literacies to train students is addressed throughout this dissertation study. This concern aligns with the studies of Hafner (2013) and Hafner et al. (2013) that teachers should improve students' digital literacy. Furthermore, Sam's advice for students about digital trails of Facebook postings evidently parallel with the study of Strickland and O'Brien (2013) that teachers should guide students to be thoughtful when they share digital content.

Therefore**,** as it is believed that digital literacies are complex because they contain multifaceted skills and issues based on White's (2015) Digitally Literate Teacher (DLT) framework, this study supports White's (2015) assertions that teachers should have a methodological framework to help them develop digital literacies and incorporate them into their pedagogical practices. For example, digital literacies consist of essential components contributing to digital literacy competence, such as computer literacy: functional skills of

operating digital devices, information literacy, media literacy, critical thinking, creativity, digital identity, digital citizenship, and digital safety.

Without a practical framework, digital users find it more challenging to improve their digital literacies to critically analyze massive online information, make digital content, and deliver it constructively in a world-wide digital community. Accordingly, I offer my digital literacy framework for digital teachers that will be discussed in the next section.

6.1.6 Teachers' Digital Literacy Informed by TPACK Assessment and the Proposal of DPACK Framework

Regarding the application of TPACK in assessing teachers' technology integration, the current study presents similar findings as those of Pamuk (2012) that incorporating technology into teaching was a hurdle regardless of the different groups of the participants. In other words, Pamuk's (2012) participants were pre-service teachers who had technological knowledge but lacked pedagogical practices, whereas the participants in this study were senior experienced teachers who were confident in their pedagogical and content knowledge.

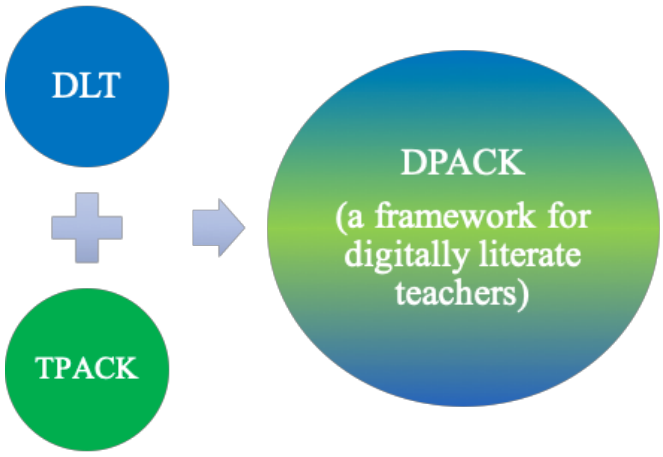
Mahdum's (2015) findings of the teachers' "good" TPACK score and their weakest technological knowledge are similar to those in this study. The survey teacher findings of this study show that the three teachers' TPACK proficiency level was good or high as 3.90 out of 5. Another finding similar to Mahdum's (2015) study was the teachers' lowest score relating to technological content knowledge (TCK).

As I believe digital literacy is more important than in the past due to the emergence of digital tools and web 2.0 technology affordances, I would like to propose a new framework, Digital (literacies and technologies) Pedagogical Content Knowledge, or DPACK, for guiding teachers to become digitally literate professionals.

Based on the findings of the three focal teachers' digital literacies informed by TPACK (Koehler & Mishra, 2009) and DLT (White, 2015) frameworks, I found some components of these two frameworks overlap. Thus, I believe it is more practical to combine two frameworks and reconstruct their components. Since the TPACK framework is recognized worldwide as an essential model for teacher to incorporate technology into teaching, I would reserve its value.

However, I found it is necessary to replace technological knowledge (TK) with Digital Literacy Knowledge or DK. I intentionally abbreviate it as DK rather than DLK to make it easier to be memorized. DK is grounded by the seven key strands of White's (2015) DLT framework. Thus, DK is similar to DLT in that is divided into two main streams: skills of using digital devices and issues around digital literacy. The following figures illustrate DPACK framework.

Figure 6.1 The DPACK framework



As can be seen from Figure 6.1, DPACK is formed by the combination of DLT and TPACK framework. The technological (T) knowledge in TPACK is substituted by digital literacy knowledge (D). The detailed descriptions of forming DPACK component are discussed as follows:

Figure 6.2 The 7 components of DPACK framework

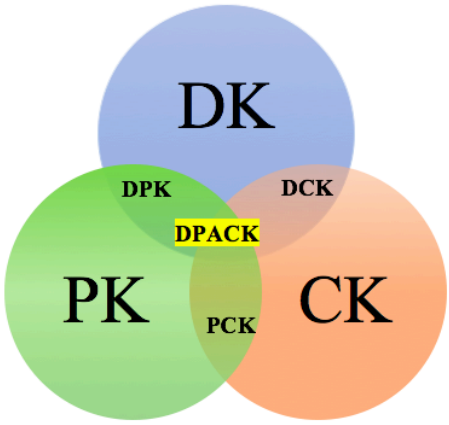


Figure 6.2 displays the DPACK framework. It consists of seven components the same as the TPACK framework (see more in Chapter 2 in the section on TPACK), but TK, TPK and TCK are transformed to DK, DPK and DCK.

As technology component in TPACK does not put an emphasis and include digital literacy skills and issues, I incorporate Digital Literacy Knowledge. (DLK) into my framework to parallel with new technology-enhanced teaching and learning in the digital age. The DK is a shortened initial of DLK for the convenience in application.

Therefore, the new proposed principles of DPACK contain DK, CK, PK, PCK, DPK, DCK and DPCK. It should be noted that three knowledge components – PK, CK and PCK – remain the same. The other four components are re-conceptualized. To clarify my point, the description of DPACK components is provided below.

1. Digital Literacy Knowledge (DK) is the knowledge of digital literacy skills that mainly include functional skills of using digital devices and digital literacy themes and issues based on the 7 strands of White's Digitally Literate Teacher framework (2015).

2. Content Knowledge (CK) is the knowledge of subject content whereby teachers should include digital literacy issues to make lessons more engaging.
3. Pedagogical Knowledge (PK) is the knowledge of teaching methodologies and learning processes, classroom management, student assessment, and lesson plan design.
4. Pedagogical Content Knowledge (PCK) is the knowledge of teaching philosophies and the subject content. The teachers are expected to deepen understanding of the subject content and select learning resources and teaching materials for teaching appropriately.
5. Digital (Literacy) Content Knowledge (DCK) is the knowledge of how the subject content is facilitated by digital literacy skills. The teachers should select and use digital technologies and social media appropriately to improve their understanding about the subject content. Also, the teachers know how to integrate digital issues to align well with curricular and course objectives.
6. Digital (Literacy) Pedagogical Knowledge (DPK) is the knowledge of digital literacy and pedagogy. It focuses on the application of digital technologies into teaching and learning. Teachers should gain deeper understanding of the affordances and drawbacks of digital technology and social media and students' digital technology use before applying them into the classrooms.
7. Digital (Literacy) Pedagogical Content Knowledge (DPACK) is the interconnected knowledge which integrates all DK, PK, and CK. It is the knowledge of digital literacies, pedagogy, and subject content. It focuses on the knowledge that teachers combine the subject content with digital literacy components to make an informed decision about selecting digital technologies for teaching. In addition, teachers

should be able to design constructive learning activities to enhance students' digital literacies.

In summary, this framework represents my own pedagogical belief based on the overall findings of this study and my observation. As clearly seen, it is an initial stage of framework design that needs modification. Therefore, I plan to further elaborate each knowledge component to be more concise and concrete for practical use in the future.

6.2 Implications of the Study

The findings of this study offer several implications regarding digital technology use of teachers and students, teachers' digital literacies, and teachers' and students' perceptions of technology-enhanced language learning and teaching. These implications can be useful for four stakeholders as follows:

6.2.1 Teachers

6.2.2 Teacher educators

6.2.3 Researchers

6.2.4 Policy-makers

6.2.1 Teachers

The implications of this study dissertation, which aims to raise teachers' awareness of technology affordance and digital literacies, may inform teachers concerning two pedagogies as follows:

6.2.1.1 Increase the integration of digital technologies and social media in their pedagogical practices

6.2.1.2 Be aware of the importance of their digital literacy development

6.2.1.1 Increase the Integration of Digital Technologies and Social Media in Their Pedagogical Practices

Because the study findings reveal that teachers use digital technologies and social media with less variety and less frequency than the students, especially for academic purposes, it is essential that teachers should explore new digital technologies and increasingly apply them in their teaching. Teachers may also need to adjust their teaching styles by incorporating social media and creating innovative technology-enhanced activities to motivate students in learning and make lessons more productive, authentic and engaging.

The findings additionally show that the students are interested in practice using English through reading and commenting on Instagram and Twitter as well as playing virtual games. The teachers should better understand that students' learning behaviors are changing to become more self-regulated, as well as the potential for mobile-assisted language learning (MALL) afforded by digital technologies and social media. Accordingly, teachers should allow students to use digital technologies for researching in the classrooms, while supervising their creative and critical uses of technology.

In addition, teachers should be more understanding and willing to acknowledge of the potentials of digital technologies and social media for students' autonomous learning development. They need to realize how technology can help connect them with their students and facilitate students' ubiquitous learning in the age of digital learning and ICT innovations.

6.2.1.2 Be Aware of the Importance of Their Digital Literacy Development

This study shows that teachers have lower understanding and competence of digital literacies than their students. Thus, teachers should realize the necessity of improving their digital literacy competence to serve the needs of students for technology-enhanced learning.

Additionally, because the findings reveal that the teachers are interested in learning technology use by creating teacher websites, it can be practical if teachers form a team to help design a teacher website as a digital portfolio for their digital literacy practice and professional development. Additionally, teachers may adopt my DPACK framework as a pedagogical guideline in integrating technology in curricula and developing their digital literacy knowledge and skills. Ideally, teachers should become digitally literate professionals in the digital era.

6.2.2 Teacher Educators

In this dissertation project, teacher education is crucial because it is necessary to train teachers to have a better understanding and knowledge of digital literacies in order to develop students' digital learning and technology-enhanced pedagogy. Accordingly, this study provides two suggestions regarding teachers' digital literacy development for teacher educators as follows:

6.2.2.1 Apply DPACK framework in analyzing and understanding teachers' digital literacies and practices

6.2.2.2 Integrate customized digital literacy training in teacher education programs

6.2.2.1 Apply DPACK Framework in Analyzing and Understanding Teachers' Digital Literacies and Practices

Teacher educators may find my proposed DPACK framework useful in understanding and analyzing teachers' digital literacy skills and technology application in their pedagogical practices. As the DPACK is an initial stage of implementation, it is worth a further investigation for its effectiveness in assessing and developing teachers' digital literacies.

6.2.2.2 Integrate Customized Digital Literacy Training in Teacher Education Programs

The findings of this study reveal that many teachers have acknowledged their limited

technological skills and digital literacy competence that impede the integration of digital technology into curricula and they demanded additional practical technology training. To make training effective, it is important that technology workshops should be tailored for specific teacher groups to fit their needs and interests. Therefore, teacher educators should recognize some unique characteristics of teachers in order to customize technology training for their optimal benefits.

Based on the overall findings, I suggest four digital web 2.0 technology-enhanced activities to teacher educators for teacher training. These projects may be useful for teachers to learn how to use new technology and develop their digital literacies.

1. Mini-workshops: The Proposal of Digital Story Creation Workshops

Because Bee and Ning have shown their interest in developing their digital literacies through creating digital stories, this study offers a digital story creation workshop proposal and lesson plan as described in Appendix I.

From my direct experience in making a digital story, this hands-on experience using digital technologies can improve teachers' technology and digital literacy competence in several ways. First, they can be creative in writing an interesting story of their own. Second, teachers can practice searching for various media such as images, audio, videos and texts, which can foster their ability in working with web tools and software programs. In addition, this activity can promote teachers' critical thinking regarding the project's purpose in order to make the story engaging. The teachers need to think carefully and critically about the plot of the story, the sequence of incidents and produce them creatively and interestingly. Finally, creating a digital story may promote their pride in their digital product and boost their confidence to integrate digital storytelling in their teaching activities in the future, which may in turn inspire and

motivate other teachers.

2. Technology Group on LINE Chat App

Based on Sam's preference in using a LINE group for technology guidance and support, a LINE group for the purpose of technology discussion can be useful for collaboration and quick communication among teachers. The group discussions might develop into a community of practice and best practice example. This strategy can provide opportunities to explore and practice technological applications in a supportive environment. In addition, this practice can increase the confidence of teachers who are novices in using digital technology for teaching. Importantly, this informal communication channel may help senior teachers be more willing in trying new digital tools in their pedagogical practices.

Bee, Sam and Ning can be leaders of the technology group. They should start inviting teachers in their team to participate in the LINE group. To make it more active, each week the three teachers can alternately post a topic for discussion, such as using games in teaching and introducing a new educational app. In addition, teachers can easily and quickly raise a technology issue about their difficulties in using digital tools and ask for assistance; due to the immediacy of social media communication, varied and detailed responses would come within minutes, and likely lead down other avenues of discussion.

3. A Single Technology Course

Teacher educators may be interested in creating a standalone course in improving teachers' digital literacy skills and knowledge to develop a better foundation of using digital technology in teaching. According to students' findings, they had taken an ICT course as a curriculum requirement although most of them are very comfortable with new digital technology use. They reported that the technology course was good and beneficial for them in order to have a good

background of using new ICTs and managing information literacies in the digital age. As a result, it is a good idea for teachers who are not confident about their technology skills to enroll in a single technology course about digital literacies, and the potential of new social media or mobile learning for academic purposes.

It is important for teachers to update and improve their technology knowledge and skills because new technology skills and the knowledge of digital literacy issues are emerging every day. Thus, teachers should take a full course of technology use based on their interests. Importantly, a course should be designed to match teachers' needs and wants and provided continually every semester for teacher development.

It may be more practical if it is an online technology course or blended learning course because teachers can then better manage their time to successfully finish the course. After completing a course, a diploma or certificate might be awarded in order to show recognition to teachers for their good effort and professional development.

4. Technology Mentoring System

The teachers' survey results reveal that technology mentors are essential to boost teachers' confidence and motivation in incorporating technology into pedagogy. Thus, based on the individual expertise of Bee, Sam and Ning, I may suggest that these teachers, who are very positive about technology use for academic purposes might become the first group of mentors in three different areas as follows:

a. Using YouTube Videos and Online Games: Bee as a Mentor

The findings reveal that Bee is good at using gamified activities on Kahoot and YouTube videos to review the lessons with the students. Thus, Bee can give advice about using digital tools to create language games to motivate students in learning English. Ning can benefit from

this kind of training because she rarely uses social media and YouTube videos as learning resources for her students. I think Ning and Sam can also learn to integrate online games to their classes to make teaching more lively and motivating.

b. Developing Student Rapport and Connection via Facebook: Sam as a Mentor

Regarding Sam's expertise in using Facebook to connect with students and develop his good rapport with the students, he can give suggestions to teachers how to communicate with students with the use of social media.

c. Using iPads and Mobile Apps in Designing Engaging Lesson Plans for Teaching Excellence and Students' Learning Development

As Ning is recognized as an excellent teacher in teaching with iPads and educational apps, she can be a good mentor in using different kinds of mobile apps on an iPad, such as Explain Everything, Nearpod and iTunes U. She is very keen on designing innovative lesson plans, and creating collaborative learning activities. Her students' final project about broadcasting a news report clip on YouTube may prove her creativity in digital literacy skills and knowledge.

6.2.3 Researchers

This study findings help inform researchers and scholars in three areas. First, due to lack of digital literacy framework for pedagogical practices, this study encourages researchers to design a new pedagogical framework to understand and evaluate teachers' digital literacy practices. Second, researchers may be interested in modifying my DPACK components to become more valid and applicable. In addition, this dissertation suggests that researchers should explore emerging social media and their affordance on language teaching and learning because social media become the key part of teachers and students' life for both academic and non-academic purposes.

6.2.4 Policymakers

Policymakers can gain benefits from the implications of this study in several aspects. First, the findings of the perceptions of teachers and students with the university policies of integrating iPad technology and iTunes U course into classrooms help the UTCC policymakers understand the current situation and challenges of technology application. For example, the teachers were satisfied with the university policies about encouraging the integration of iPads and iTunes U courses into teaching. However, they complained about time restriction, teaching overloads and the unreliability of Internet access that made them frustrated and not want to integrate technologies into their teaching. Therefore, the policymakers may find it necessary to consider revising their language policies to suit the needs of in-service teachers and students for better pedagogical and learning outcomes.

Second, administrative boards of schools should have a strategic action plan of integrating technology and digital literacy into teaching and learning to attain the goal of becoming the university of digital innovations with "iHybrid" learning and teaching. In other words, each school should encourage teachers to organize a small group of interested teachers in technology. The members of the group could then actively support the production and delivery of technology-enhanced activities. This may help develop positive attitudes toward technology integration into curricula. Moreover, a creation of LINE group for communicating about digital technology use can be also useful and productive.

Moreover, policymakers may invest in purchasing educational apps for teachers or allocating a budget for supplying digital technological devices for experimental learning. They may want to initiate a series of productive pedagogical and technological training and workshops for teachers in digital literacy development.

More importantly, the university may consider reasonable incentives, such as honorary awards, promotion, and monthly monetary incentives, for teachers who actively implement technology into pedagogy and create collaborative learning. An increase in incentives and promotion for teachers who dedicate in integrating technologies into curricula is worth consideration.

In summary, the objective of this dissertation aims at raising awareness of teachers, teacher educators, researchers and policymakers about the importance of digital literacy training and development. Teacher and teacher educators should integrate digital web 2.0 technology-enhanced activities into today's instruction for the new generation's autonomous and ubiquitous learning. Researchers should investigate the potential of emerging digital technologies and social media and suggest their strengths and weaknesses. Finally, policymakers should create technology policies that conform with curricula, teaching loads and teachers' needs for effective pedagogical practices.

6.3 Limitations of the Study

Although this study was carefully designed to address its goals thoroughly, there are some flaws that need to be acknowledged. They will be described in four sub-topics for future research improvement as follows:

6.3.1 Generalization of the findings

6.3.2 The selection bias and limited number of participants

6.3.3 The limited time for data collection

6.3.4 The researcher's positionality

6.3.1 Generalization of the Findings: Internal Validity

As the teachers must identify themselves with their email address on the teacher survey, this

may affect the reliability and validity of the data. Moreover, the results of the study will be reported to the administrators of the university. As a result, the teachers may be wary of their negative responses in the survey and not reveal their true feelings. In addition, the self-assessment survey results of both teachers and students may contain bias and overrated information for themselves although data triangulation was employed. Furthermore, the participants may have felt obliged to give responses to make the researcher satisfied with their answers.

6.3.2 The Selection Bias and Limited Number of Participants: Three Case Studies

The three teachers were recruited as case studies in this study because of their willingness to help the researcher complete the project while some other teachers were not cooperative or confident. Besides, the three focal teachers, feeling positive about technology for teaching, were interested in participating in this study. As a result, despite great depth and detail of analysis the three teacher profiles may not entirely reflect the digital technology use and digital literacy skills of English language teachers in Thailand. Moreover, the study employed a small sample size of population, 38 teachers and 57 students whose scope is limited to only the English department of the school of Humanities and Applied Arts. Thus, this limitation may not be sufficient to assume that English language teachers and students elsewhere in Thailand have similar perceptions as those of the participants in this study.

6.3.3 The Limited Time for Data Collection: Only Eight Weeks

The short timeframe of data collection of eight weeks may not have provided a complete picture of the teachers' application of technology into their classrooms. Hence, future research should conduct a longitudinal study of a whole semester.

6.3.4 The Researcher's Positionality: An Insider

As I personally know the teacher participants as colleagues and used to work at the university, my interpretation of findings included some personal reflections that go beyond the data results. However, I am always cautious of my arguments throughout the data analysis process.

6.4 Suggestions for Future Research

From the data findings of this study, I discovered many prospects for future research. First, creating strategies for encouraging teachers to deliver innovative teaching with digital technology and for developing digital literacies needs more investigation. I suggest that peer class observation and class video-recording may be applied to some extent to motivate teachers to value the creative and constructive teaching in other classes. More research is needed to examine the effect of these methods on teachers' perceptions about technology integration. For triangulation of reliability, it would be helpful that future research should include policymakers as participants besides teachers and students in order to explore their perceptions about the effectiveness and the barriers of promoting technology integration across the university.

It should be noted here that while the majority of teachers reported their high satisfaction with technology integration policies of the university, they did not, in fact, apply it productively. The reasons are limited technological skills and overloaded teaching hours. However, according to the conversations with a university staff and a trainer for the Center for Teaching Excellence, the technological development workshop series offered by the Center had to be cancelled because there were not any interested teachers. This unexpected circumstance was understood by the training organizers to be that the teachers were too busy with teaching. Thus, I think it may be useful and practical to explore the viability of online technological training courses to develop teachers' digital technology skills as the findings of this study reveal that the teachers prefer to

learn technology by doing and by themselves.

Third, referring to the multifaceted components of digital literacies based on the DLT framework of White (2015), it is necessary to explore more in-depth how teachers in other institutions apply any or all of the seven strands of digital literacy skills and issues in their pedagogical practices to develop students' digital literacy. In addition, as most teachers and students agree that digital literacy instruction is necessary in the English curricula, it would be useful to explore how digital literacy training is integrated into English language teaching and learning.

Moreover, researchers may want to evaluate the digital literacy of teachers in depth apart from using self-assessment reports. A future study may also want to adapt the DPACK framework proposed here to assess digital literacy skills and knowledge more holistically and systematically. Finally, since digital literacy studies and literature in the Thai contexts are very limited especially teacher education, more research should be conducted in the implementation of innovative digital web 2.0 technology-enhanced activities, such as creating digital storytelling projects and multimedia YouTube clips to develop digital literacies of teachers.

6.5 Contributions of the Study

This dissertation has responded to a call for the investigation of digital literacy of in-service teachers and their perceptions of technology application into curricula. The findings of this dissertation are intended to fill a gap in the research on the digital literacy of Thai teachers and students, teacher education on digital literacies, and technology-enhanced language learning and teaching (TELLT) in Thai contexts. This study originally examined the digital literacy skills and proficiency of in-service English language teachers in Thailand by adopting two conceptual frameworks: Technological Pedagogical Content Knowledge (TPACK) and Digitally Literate

Teacher (DLT). The DLT framework is new and has not been implemented in any research before based on my understanding.

In addition, the proposal of a DPACK framework may activate the interests of researchers and scholars to modify its components for pedagogical application. The DPACK may be helpful for teachers to integrate digital literacy skills into curricula. It may inspire them to design constructive and creative teaching methods afforded by web 2.0 technologies. Also, the teachers may feel it is necessary to adjust content of the subjects to be more updated and aligned with the learning needs of the new generation Z in an age of emerging and evolving digital technologies.

Furthermore, the dissertation provides insights into the perceptions of teachers and students about incorporating technology into pedagogy and the benefits and challenges of technology-enhanced language teaching and learning. The deeper understanding of these issues is invaluable to raise the awareness of teachers, researchers, and policymakers to recognize the teachers and students' hurdles of applying technology into teaching and learning. As a result, all stakeholders will find strategies to improve the potential of technology-enhanced pedagogy in the future. More practically, this study suggests various digital literacy resources to give an initial idea for teachers to develop their digital literacy for professional development. Furthermore, the teachers may be motivated to design an engaging learning activity with one of these digital technological resources to enhance students' digital literacy in English classrooms.

6.6 Conclusion

This qualitative study's goal is to raise teachers' awareness of the potential benefits of digital technologies and social media integration into curricula and the necessity of digital literacy development for English language pedagogy in Thailand. Thus, the study assessed the digital literacies of in-service teachers and students and explored their perceptions of technology-

enhanced language teaching (TELT) to understand the current situation of teachers' and students' digital technology use and their digital literacy competence.

The research findings show that the teachers used less various digital technologies and social media than their students for academic and non-academic purposes which may account for the teachers' underestimation of the students' social media use for English learning. More significantly, the concept of digital literacies and constructive TELT approaches have not been well understood by most Thai teachers. More particularly, the cases of three teachers, Bee, Sam and Ning, have demonstrated that their knowledge and competencies of digital literacies guided by TPACK and DLT frameworks were rather low although they appeared to be the most knowledgeable teachers.

This lack of understanding may be because Thai teachers have become accustomed to the traditional lectured-based teaching approach. They said they were also too busy with teaching overloads to explore the viability of new technology and social media. In addition, the teachers were reluctant to apply technologies into their pedagogy because they felt dissatisfied with technology unreliability, and worried about the students' low English proficiency. Importantly, they admitted that their technology skills and digital literacies were limited and even lower than those of their students. Although some teachers integrated technology-enhanced language learning activities in the classrooms, they were still restrictive and not engaging.

It is worth noting that the overall findings show that teachers were aware that it was necessary to incorporate technologies into teaching to follow the university's technology policy and the trend of digital learning afforded by web 2.0 technologies and smart phones. Thus, it is the time that digital literacy knowledge and technology skills should be compulsorily integrated into teacher education programs and teacher training. Importantly, technology workshops must be

tailored to fit teacher's needs and wants to make them more effective and applicable in realistic situations in the classrooms. As the teachers' evaluation on digital web 2.0 technology-enhanced activities in improving digital literacy revealed that Thai teachers wanted technology mentors to seek support, policymakers may find ways to accommodate this request.

In summary, this study responded to a call in raising awareness of teachers to develop their digital literacy skills to create constructive technology-enhanced language learning and teaching for students in the age of digital technology and social media.

The overall findings indicate that although emerging digital technologies seemed to be more manageable and friendly for teachers, engaging and creative learning activities augmented by digital technologies are rarely seen in English-language classes. This study suggested that one main obstacle in technology integration is the limited digital literacies of English language teachers in Thailand. Their digital literacy skills and knowledge were quite low because they lacked time, interest, and substantial practices of digital technologies and social media. It is important that these issues should be heard by researchers, teacher educators and policymakers to find quick solutions. Obviously, digital literacy training and technological workshops for specific purposes can accommodate the issues of insufficient technology skills.

I believe, however, that the key to success in delivering new productive English language lessons enhanced by digital technology and social media is the strong belief on technology potential and dedication of teachers in improving students' digital literacies. Thus, it is worth restating my main call here that teachers in the 21st century should be more aware of digital technology affordances, open-minded and dedicated in exploring emerging technologies and develop their digital literacies to become digitally literate professionals.

APPENDIX A

A MATRIX FOR THE STUDY

What do I need to know? (Research Questions)	Why do I need to know? (Goals)	Data Collection Methods	Data Analysis Methods
1. What new digital technologies do in-service teachers and students use for academic and non-academic purposes?	-To understand the technology routines of students and teachers inside and outside of classrooms.	-Questionnaire -Class observations	-Descriptive statistics: frequency, mean -Develop matrix with participants' data
2. What are in-service teachers' perceptions of how students use technologies for academic and non-academic purposes?	-To recognize the congruence or difference between teachers' perceptions and students' actual uses of technology.	-Questionnaire -Teacher interviews: semi-structured, open-ended questions -Student focus group discussions	-Content analysis -Group responses into themes -Develop matrix with participants' data
3. What are in-service teachers and students' perceptions of technology integration into curricula?	-To understand the connection between the technology and language instruction. -To understand the extent to which teachers and students are aware of the affordances and limitations of technologies (i.e. iPads). -To understand factors which promote and inhibit technology integration from teachers' perspectives.	-Student focus group discussions -Teacher interviews: semi-structured, open-ended questions	-Verbatim -Open- coding -Re-reading -Develop matrix with participants' data
4. How do in-service teachers' perceptions of how they and student use technology inside and outside of the classroom impact how the teachers	-To understand the meaning of digital literacies from the teachers' perspectives. -To better understand how digital literacies are taught	-Teacher interviews: semi-structured, open-ended questions	-Verbatim -Open-coding -Content analysis

apply technology to their pedagogical practices?	and assessed by the teachers.	-Class observations -Researcher's field notes -Unobtrusive data of artifacts: students' finished assignments and course syllabi	
5. How do in-service teachers evaluate the usefulness and viability of various technological resources?	-To understand the extent to which the teachers perceive and evaluate technological resources. -To find appropriate tools to develop teachers' digital literacies.	-Teacher interviews: semi-structured, open-ended questions -Questionnaire	-Verbatim -Open-coding

APPENDIX B

PARTICIPANT INFORMATION

The table displays the information about the students' and teachers' age, gender, educational background, teaching experience and technological competence.

Data Collection Methods	Courses	Participants	Program / Faculty	Digital technology level /skills (iPads)	Other Information
1. Two surveys - for teachers (58 distributed, 37 returned, 63.7% return rate) -for students (79 distributed, 58 returned, 73.4% return rate)	Varying English courses	-37 English teachers (25 female and 12 male) -31 Thais, 6 foreigners -34-59 years old -5-27 years of teaching experience -9-21 hours of teaching per week	-School of Humanities & Applied Arts (HMA) - 4 from English & Translation (E&T) -6 from English for Business Communication (EBC) -27 from Business English (BE)	-Beginner to advanced -Many are not very interested in applying technology into class.	-Most are experienced seniors. - Confident and independent in pedagogical practices and class management.
		-58 students, 57 from HMA -1 from Business Administration (BA) -19-27 years old	-6 from EBC/HMA -23 from E&T/HMA -28 from Japanese/ HMA -1 from Logistics /BA	Intermediate to advanced skills	
2. Classroom	1.English from	-8 juniors -21-23 years	-7 from EBC/	High intermediate	- Motivated, active, confident

observation -2 times per class -6 times in total (16 hours)	Media (elective) (HR 334) Week 4 (3 hours) Week 9 (3 hours-after midterm exam week) 6 hours in total	old	HMA -1 from Logistics /BA	on iPad usage	students - High Intermediate English proficiency
		Sam; -An American male -52 years old -15-hour teaching load / week -practical, open-minded, kind, supportive	E&T/HMA	Intermediate on Facebook / social media technology use	-26 years of English teaching experience - 4 years of iPads-based teaching - Have some digital literacies - Use mostly Facebook, emails and iTunes U
	2. English for Communication 4 (core course) (HG 010) Week 3 (3 hours) Week 5 (3 hours) 6 hours in total	- 43 freshmen -19-21 years old	Japanese / HMA	Intermediate	-Pre-intermediate English proficiency - Active, punctual and disciplined
		Bee; - A Thai female - 37 years old -18-hour teaching load/week - well-organized and critical.	BE / HMA	Intermediate	- A Ph. D holder - 10 years of teaching experience - Use mostly iTunes U, Kahoot, and YouTube.
	3. Science & Technology Translation (core course) (HR340)	-28 juniors and seniors -21-27 years old	ET / HMA	High intermediate	- High intermediate English proficiency
		Ning -A Thai female senior -54 years old - 9-hour teaching		Advanced	- 17 years of teaching experience - 7 years of iPad-enhanced teaching

	Week 4 (3 hrs) Week 7 (1 hr) 4 hours in total	load/week -supporting, rigorous, trainer			- Passionate in using iTunes U, Nearpod, mobile apps and iPads in teaching.
3. Teacher interviews - 6 times - 5- 6 hours in total	3 English class teachers, HR 334, HG010, HR340	-1 male (Sam) -2 females (Bee and Ning)	HMA	Low intermediate to advanced	-Open-minded, confident in using technologies; iTunes U, LINE, Facebook, websites and YouTube videos in their classes.
4. Student focus group discussions (3 groups) - 3 times - 1.5- 2 hours in total	1. HR 334	7 juniors	-1 from Logistics / BA -6 from EBC/ HMA	High intermediate	- high intermediate English -Very confident in using iPads
	2. HG 010	4 freshmen	Japanese/ HMA	Intermediate	-Familiar with digital tools for fun e.g., games, and social media
	3. HR 340	5 juniors	E&T/HM A	High Intermediate to Advanced	-Very competent iPad users for mobile apps: iTunes U, and Nearpod apps.
5. Artifacts	1. HR 334	- Students' presentation slides on iPads - iTunes U course of HR 334 - Photos in the class - Course syllabus - Teacher's short paper about DLT framework			
	2. HG 010	- iTunes U course of HG010 - Textbook - Photos in the class - Course syllabus - Teacher's short paper about DLT framework			
	3. HR 340	- Photos in the class - Course syllabus			
	Researcher	- Field notes from class visits, student focus group discussions and teacher interviews			

APPENDIX C

THREE TEACHERS' DATA COLLECTION SCHEDULE

Teachers	Courses	Class observation 1	Interview 1	Class observation 2	Interview 2
1.Bee	English for Communication 2 (HG010)	01/23/18 8:30-11:30 (3 hours) Week 3	01/24/18 9:15-9:45 (30 mins) Week 3	02/06/18 8:30-11:30 (3 hours) Week 5	02/07/18 9:20-10:00 (40 mins) Week 5
2.Sam	English from Media (HR334)	01/30/2018 8:30-11:30 (3 hours) Week 4	01/31/18 10:30-11:15 (45 mins) Week 4 cont. 2/19/18 11:30-12:00 (30 mins) Week 7	03/06/18 8:30-11:30 (3 hours) Week 9	03/07/18 10:30-11:15 (45 mins) Week 9
3.Ning	Science and Technology Translation (HR340)	01/ 29/18 12:30-15:30 (3 hours) Week 4	01/ 29/18 15:45-16:30 (45 mins) Week 4	02/19/18 12:30-13:30 (1 hour) Week 7	02/19/18 15:30-16:00 (30 mins) Week 7

APPENDIX D

TEACHER SURVEY RESULTS (1)

Questions	**Bee**	**Sam**	**Ning**	**n=total number** **M= mean for all responses**
Background information				
1.What is your gender?				
Male		x		n=12, 32.43%
Female	x		x	n=25, 67.57%
2. How old are you?				
25-29				n=0
30-39	x			n=8, 21.62%
40-49				n=11, 29.73%
Above 50		x	x	n=18, 48.65%
3. What is the highest degree you have completed?				
Bachelor's				n=2, 5.41%
Master's of Arts / Education		x	x	n=19, 51.35%
Doctor of Philosophy	x			n=16, 43.24%
4. How many years of English teaching experience have you had?				
1-4 years				n=0
5-9 years	x			n=3, 8.11%
10-14 years				n=10, 27.03%
15-19 years			x	n=4, 10.81%
20-25 years				n=8, 21.62%
More than 25 years		x		n= 12, 32.43%
5. How many hours a week do you teach?				
5-9 hours			x	n=8, 21.62%
10-14 hours				n=10, 27.03%
15-19 hours	x	x		n=16, 43.24%
More than 19 years				n=3, 8.11%
6. Please write the course name(s) you are teaching.	open			
7. Please circle the position on the continuum that best describes your technology use for academic purposes. Never (1) Seldom (2) Sometimes (3) Frequently (4) Always (5)				
a) I use Websites as sources to teach English.	5	5	5	M=4.14
b) I use iPads to teach English.	1	4	5	M=3.00
c) I use ITunes U to teach English.	5	5	5	M=3.30
d) I use mobile apps / software for teaching (e.g., online dictionary).	3	3	5	M=3.24

e) I use social network sites for language teaching (e.g., Duolingo).	1	2	1	M=2.22
f) I use Wikis to teach English.	2	4	2	M=2.38
g) I use blogs to develop my writing.	1	2	1	M=1.62
h) I use emails to communicate with students.	1	4	2	M=3.62
i) I use Twitter to teach English.	1	2	1	M=1.11
j) I use Instagram to teach English.	1	1	1	M=1.11
k) I use Skype to communicate with students.	1	1	1	M=1.14
l) I use LINE to teach English.	1	4	1	M=2.73
m) I use Facebook to teach English and communicate with students.	1	5	3	M=2.30
n) I use virtual games (e.g., Second Life, World of Warcraft) to teach English.	1	2	1	M=1.27
o) I use Pinterest to teach English.	1	1	1	M=1.22
p) I use YouTube videos to teach English.	4	5	3	M=3.49
q) I use Clickers to teach English.	1	1	2	M=1.19
Mean	**1.82**	**3.00**	**2.35**	**2.30**
8. What is the most frequent technology you use for teaching? (e.g., ITunes U course management, Facebook, YouTube, Dictionary app, Line, Google (Safari), Mail, Game apps)	open			
9. How do you apply the technology you mentioned to teaching?	open			
10. Please circle the position on the continuum that best describes your technology use for non- academic purposes. Never (1) Seldom (2) Sometimes (3) Frequently (4) Always (5)				
a) I surf websites for fun to read interesting things.	5	5	4	M=4.62
b) I use iPads for fun.	3	4	5	M=3.68
c) I use iTunes U course to read for fun.	3	1	1	M=1.68
d) I use mobile apps for living and fun.	3	5	3	M=3.43
e) I use emails to communicate with family and friends.	5	5	5	M=4.05
f) I read and write on the Wikis for fun.	2	4	1	M=2.11
g) I read and write blogs for fun.	1	2	1	M=1.78
h) I use Twitter for fun.	1	3	2	M=1.46
i) I use Instagram for fun.	1	1	2	M=1.84
j) I use Skype for fun and communication with family and friends.	1	2	1	M=1.95
k) I use LINE chat app for fun and communication with family and friends.	5	4	5	M=4.51
l) I use Facebook for fun and communication with family and friends.	5	5	5	M=4.05
m) I play virtual games (e.g., Second Life, World of Warcraft).	1	2	1	M=1.38
n) I use Pinterest for fun.	1	1	1	M=1.86
o) I watch YouTube videos for fun.	5	5	2	M=4.32
Mean	**2.80**	**3.27**	**2.60**	**2.85**
11. What is the most frequent technology you use for fun?	open			

(e.g., Facebook, YouTube, Dictionary app, Line, Google (Safari), Mail, Game apps)				
12. How do you use technology you mentioned for fun?	open			
13. What are your assumptions on how your students use technology in learning English? Never (1) Seldom (2) Sometimes (3) Frequently (4) Always (5)				
c) They use Websites to learn English.	4	4	3	M=3.30
d) They use iPads to help them learn English.	4	4	3	M=3.54
e) They use iTunes U course to learn English.	5	4	3	M=3.49
f) They use mobile apps to learn English (e.g., online dictionary)	3	4	3	M=3.38
g) They use social network sites for language learning (e.g., Duolingo)	3	4	2	M=2.59
h) They use Wikis to learn English.	3	2	1	M=2.16
i) They use blogs to learn English.	3	2	1	M=2.08
j) They use emails to communicate with teachers.	2	3	1	M=3.59
k) They use Twitter to learn English.	1	3	1	M=2.03
l) They use Instagram to learn English.	1	4	1	M=1.97
m) They use Skype to communicate with teachers and classmates.	2	2	1	M=1.76
n) They use LINE to learn English.	1	4	1	M=2.86
o) They use Facebook to learn English.	1	5	1	M=3.19
p) They play virtual games (e.g., Second Life) to learn English.	2	4	1	M=2.46
q) They use Pinterest to learn English.	1	4	1	M=1.67
r) They watch YouTube videos to learn English.	5	5	2	M=3.84
Mean	**2.56**	**3.69**	**1.63**	**2.74**
14. What are your assumptions on how your students use technologies for fun? Never (1) Seldom (2) Sometimes (3) Frequently (4) Always (5)				
g) They surf webs to read interesting information for fun.	5	4	3	M=4.24
h) They use iPads for fun.	5	4	5	M=4.62
i) They use iTunes U course to read for fun.	2	2	1	M=2.03
j) They use mobile apps for fun.	5	4	4	M=4.30
k) They use Wikis for fun.	2	2	1	M=2.22
l) They use blogs for fun.	1	2	1	M=2.43
m) They use emails to communicate with family and friends.	5	2	1	M=3.19
n) They use Twitter for fun.	5	2	2	M=3.31
o) They use Instagram for fun.	5	5	4	M=4.0
p) They use Skype to communicate with family and friends for fun.	5	2	2	M=4.19
q) They use LINE for fun.	5	5	4	M=4.76
r) They use Facebook for fun.	5	5	4	M=4.70
s) They play virtual games (e.g., Second Life, World of Warcraft).	5	5	5	M=4.30
t) They use Pinterest for fun.	2	3	2	M=2.58

u) They watch YouTube videos for fun.	5	5	5	M=4.76
Mean	**4.13**	**3.47**	**2.93**	**3.71**
Digital Participation 15. How many hours per day do you participate in the digital community? Never (0) less than 1 hour (1) 1-2 hours (2) 2-3 hours (3) 3-4 hours (4)More than 4 hours (5)				
a) Facebook	2	4	2	M=2.08
b) Twitter	0	1	0	M=0.22
c) YouTube	4	3	0	M=2.30
d) Instagram	0	0	0	M=0.57
e) Line	3	3	2	M=2.46
f) Web blogs	2	1	0	M=0.59
g) Online news and updates	2	5	2	M=2.38
h) Online games	0	1	0	M=0.51
i) Other online communities (e.g., Pantip)	2	1	0	M=1.08
Mean	**1.67**	**2.11**	**0.78**	**1.32**
Engagement & Comfort with Technology 16. How do you engage and feel about the following? Never / Very Low (1) Low (2) Medium (3) High (4) Very High (5)				
a) I took college courses devoted to technology-enhanced language teaching.	3	1	1	M=2.27
b) I have had sufficient training with technology usage from the university.	3	4	3	M=2.92
c) I collaborate with other teachers to design technology -enhanced language teaching activities.	2	3	1	M=2.38
d) I am interested in learning more about technology -enhanced language teaching.	4	3	4	M=3.81
e) I prefer to develop my technology skills by doing.	4	5	5	M=4.03
f) I prefer to receive technological trainings and support.	4	3	4	M=3.68
g) I am comfortable with using digital technologies for teaching.	3	4	5	M=3.65
h) I am comfortable with using digital technologies for fun.	5	4	2	M=3.73
i) I am confident about choosing appropriate digital tools to support teaching.	4	3	4	M=3.50
j) I am confident about designing innovative teaching materials with digital technologies.	3	2	4	M=3.05
Mean	**3.50**	**3.20**	**3.30**	**3.30**
17. What are your perceptions on different barriers to integrate technology into curriculum? A Very High Barrier (1) High (2) Medium (3) Low (4) A Very Low Barrier (5)				
a) Personal motivation	2	4	2	M=3.68
b) Collaboration with other teachers	2	4	3	M=3.08
c) Technological training and support	1	3	4	M=3.22

d) University infrastructures and facilities	1	4	1	M=3.22
e) Budgeting for new technologies (apps)	1	4	1	M=3.14
f) Technology and Internet access	1	3	1	M=3.24
g) Time for teaching preparation	2	2	1	M=2.78
h) Classroom management	2	3	2	M=2.72
i) Assessment aligned with technology use	1	4	4	M=2.89
j) Technical problems in the classroom	1	3	1	M=2.54
k) Institutional policies and administration	1	4	2	M=3.38
l) Subject content	2	4	3	M=3.05
m) Teaching methods and styles	2	3	3	M=3.03
n) Teaching loads and responsibilities	1	3	1	M=2.57
o) Technological skills of my own	1	4	4	M=3.03
p) Technological skills of students	1	4	2	M=3.38
q) English proficiency of students	3	3	1	M=2.30
r) Motivation of students	1	4	1	M=2.49
s) Learning styles of students	1	3	1	M=2.81
Mean	**1.42**	**3.47**	**2.00**	**2.98**
18. What might be the biggest obstacle that impede your technology integration into curriculum?	open			
19. What are your perceptions on your institution related to technology integration into teaching? Very Low (1) Low (2) Medium (3) High (4) Very High (5)				
e) I am satisfied with the university's technological support and training.	4	4	4	M=3.62
f) I am satisfied with the university's technological infrastructure.	4	4	1	M=3.57
g) I am satisfied with the university's policy about increasing technology integration.	4	4	3	M=3.89
h) I am satisfied with the university's policy about taking online exams on iPads.	3	3	2	M=2.65
i) I am satisfied with the university's policy about creating iTunes U courses.	4	5	5	M=3.70
j) I am satisfied with the university's policy about encouraging the use of iPads and other technologies.	4	5	5	M=3.97
Mean	**3.83**	**4.17**	**3.33**	**3.57**
20. What are your perceptions on these technology-enhanced language teaching activities aimed to promote your digital literacies? Strongly disagree (1) Disagree (2) Neither Agree or Disagree (3) Agree (4) Strongly Agree (5)				
a) Having a technology mentor/ tutor.	5	3	4	M=4.14
b) Creating an e-teaching portfolio.	3	2	3	M=3.30
c) Creating a YouTube video project.	5	4	4	M=3.57
d) Creating a digital storytelling project.	5	4	4	M=3.46
e) Creating a teacher blog.	3	2	3	M=3.35
f) Creating a Twitter.	3	4	2	M=2.08
g) Creating a Facebook page for teachers who are	4	5	1	M=3.43

interested in technology.				
h) Creating a teacher website.	3	3	4	M=3.54
i) Creating a LINE group to discuss technology use.	4	5	1	M=3.38
Mean	**3.89**	**3.33**	**2.67**	**3.36**
21. In your own words, how would you define digital literacies?	open			
22. What is your level of digital literacies (according to your own understanding of this term)? Very Low (1) Low (2) Medium (3) High (4) Very High (5)	3	3	4	M=3.22
23. Generally, what is your digital literacies compared to typical undergraduate students? Much Lower (1) Lower (2) Medium (3) Higher (4) Much Higher (5)	2	3	4	M=2.95
24. Generally, what is your digital literacies compared to people around your age? Much Lower (1) Lower (2) Medium (3) Higher (4) Much Higher (5)	3	4	5	M=3.49
Mean of items 22-24	**2.67**	**3.33**	**4.33**	**3.22**
25. In your opinion, are digital literacies necessary to be taught in your course? Why or why not?	open			
26. What **factors** influence you to select particular technology in teaching? (e.g., students' need, students' motivation, your interest, your expertise, your institutional policy)	open			
27. How do you apply iTunes U course management to your teaching?	open			
28. How do you apply iPads to your teaching?	open			
29. What are the benefits and drawbacks of technology-enhanced language teaching?	open			
30. What do you think can help you become more confident and comfortable with technology integration into English teaching?	open			

APPENDIX E

TEACHER SURVEY RESULTS (2)

Questions	**Bee**	**Sam**	**Ning**	**n=3, mean for 3**
Self-Assessment				
1. How is your **general digital skill level** for these activities? Never / Very Low (1) Low (2) Medium (3) High (4) Very High (5)				
a) Type English texts.	4	5	5	4.67
b) Create a multimedia PowerPoint presentation.	4	4	4	4.00
c) Upload a video to YouTube.	2	1	4	2.33
d) Use the main features of Facebook.	3	5	5	4.33
e) Use the main features of Twitter.	1	3	3	2.33
f) Use the main features of LINE.	3	4	4	3.67
g) Use the main features of Instagram.	1	1	3	1.67
h) Use a search engine (Google, Safari).	4	5	5	4.67
i) Create/ send / receive phone text messages.	4	5	4	4.33
j) Take photos with smartphones.	4	4	5	4.33
k) Record videos with smartphones.	4	4	5	4.33
l) Download and use mobile phone apps.	3	4	5	4.00
m) Use computer programming to create software.	2	1	3	2.00
Mean for all general skills of each participant	**3.00**	**3.54**	**4.23**	**3.59**
2. Technological Pedagogical Content Knowledge (TPCK) Never / Very Low (1) Low (2) Medium (3) High (4) Very High (5) 2.1 How is your self-assessment based on **Technological Knowledge (TK)**?				
a) I know how to solve my own technical problems.	3	4	3	3.33
b) I can learn technology easily.	4	4	4	4.00
c) I keep up with new technologies.	3	4	4	3.67
d) I frequently play around with the technology.	3	3	5	3.67
e) I know about a lot of different technologies.	3	4	4	3.67
f) I have digital technology skills.	3	5	4	4.00
g) I have had sufficient opportunities to work with different technologies.	3	4	3	3.50
Mean for TK of each participant	**3.14**	**3.81**	**3.86**	**3.67**
2.2 How is your self-assessment based on **Content Knowledge (CK)?**				
a) I have sufficient knowledge about English literacy.	4	5	4	4.33

b) I have various strategies of developing my understanding of English literacy.	4	5	4	4.33
Mean for CK of each participant	**4.00**	**5.00**	**4.00**	**4.33**
2.3 How is your self-assessment based on **Pedagogical Knowledge (PK)?**				
a) I can assess student performance in multiple ways.	4	5	5	4.67
b) I can adapt my teaching to match students' proficiency level.	4	5	5	4.67
c) I can adapt my teaching style to different learners.	4	5	5	4.33
d) I can use a wide range of teaching approaches in a classroom.	4	4	4	4.00
e) I am familiar with common students' understandings and misconceptions.	4	4	4	4.00
f) I know how to manage a classroom.	4	4	5	4.33
Mean for PK of each participant	**4.00**	**4.50**	**4.50**	**4.33**
2.4. How is your self-assessment based on **Pedagogical Content Knowledge (PCK)?** I can select effective teaching approaches to guide students in learning English	3	4	4	3.67
2.5. How is your self-assessment based on **Technological Content Knowledge (TCK)?** I know about technologies that I can use for understanding English literacy.	3	3	4	3.33
2.6 How is your self-assessment based on **Technological Pedagogical Knowledge (TPK)**				
a) I can choose appropriate technologies that enhance the teaching approaches for a lesson.	4	3	5	3.68
b) I can choose appropriate technologies that enhance students' learning for a lesson.	4	3	4	3.08
c) I think critically when I use technology in my classroom.	4	4	5	3.22
d) I can adapt the use of the technologies to different teaching activities.	4	4	5	3.22
Mean for TPK of each participant	**4**	**3.5**	**4.75**	**3.89**
2.7 How is your self-assessment based on **Technological Pedagogical Content Knowledge (TPACK)?**				
a) I can combine literacy, technologies, and teaching approaches for teaching.	3	4	4	3.67
b) I can select technologies to enhance my teaching.	4	4	5	4.33
c) I can use strategies that combine content, technologies, and teaching approaches in my classroom.	3	5	5	4.33

d) I can help others to integrate the use of content, technologies, and teaching approaches.	3	3	4	3.33
Mean for TPCK of each participant	**3.25**	**4**	**4.5**	**3.92**
Total Mean for 7 components	**3.48**	**3.97**	**4.23**	**3.90**
3. Digitally Literate Teachers Framework (DLT) Never / Very Low (1) Low (2) Medium (3) High (4) Very High (5) 3.1 How do you assess your understanding about your own position as a digitally literate teacher and the relationship between skill and practice?				
a) I understand my own digital needs, abilities and practices and aim for professional growth.	3	4	5	4.00
b) I understand the relationship between digital literacy and my subject contents.	3	3	5	3.67
Mean for Strand 1 of each participant	**3.00**	**3.50**	**5.00**	**3.83**
3.2 How do you assess your skills in recognizing learners' digital needs, abilities and practices and planning learning around the development of relevant digital skills?				
a) I understand the issues around learning in the digital age: digital exclusion / inclusion and equality of access.	2	3	4	3.00
b) I understand learners' digital needs, abilities and knowledge.	4	3	4	3.67
c) I can take the knowledge of learners to guide teaching, learning and assessment.	4	4	4	4.00
Mean for Strand 2 of each participant	**3.33**	**3.33**	**4.00**	**3.56**
3.3 How do you assess your skills in selecting appropriate digital tools and using them creatively, critically and productively?				
a) I am willing to use digital technologies in professional practice and recognize best practices, legal, policy, safety and security concerns.	4	5	5	4.67
b) I can teach creatively through interactive and engaging activities.	4	5	4	4.33
c) I understand the pedagogical theory around digital learning.	3	2	4	3.00
Mean for Strand 3 of each participant	**3.67**	**4.00**	**4.33**	**4.00**
3.4 How do you assess your critical approach development to digital information?				
a) I understand information literacies.	2	4	4	3.33
b) I can distinguish between different types of digital information and media.	2	5	4	3.67
c) I can search for, find, assess, use and apply digital information.	2	4	4	3.33

d) I can actively seek out digital information to improve teaching.	2	4	4	3.33
Mean for Strand 4 of each participant	**2.00**	**4.25**	**4.00**	**3.42**
3.5 How do you assess your skills in forming and managing a professional digital identity and using it to engage professionally?				
a) I can create a professional digital identity on social networks.	3	4	4	3.67
b) I can critically understand and engaging with digital footprint, reputation and capital.	2	1	3	2.00
c) I can actively create digital contents and share them in online communities.	2	4	3	3.00
d) I understand the significance of engagement in digital communities to non-virtual world.	2	3	3	2.67
Mean for Strand 5 of each participant	**2.25**	**3.00**	**3.25**	**2.83**
3.6 How do you assess your understanding and leading on digital safety, security, ethical and legal responsibilities and citizenship?				
a) I understand legal responsibilities to learners and apply this to own practice (e.g., cyberbullying and inappropriate conduct online).	3	5	5	4.33
b) I understand how equality and diversity, and standards, legislation and local policies apply to digital environment.	3	4	5	4.00
c) I understand own legal, ethical and professional rights and responsibilities when using, creating and publishing digital content (e.g., copyright, plagiarism and acknowledgement of sources)	3	5	5	4.33
d) I understand the definitions of digital citizenship and recognize the rights and responsibilities.	2	3	5	3.33
e) I understand how actions online can have real-world significance.	3	5	5	4.33
Mean for Strand 6 of each participant	**2.80**	**4.40**	**5.00**	**4.07**
3.7 How do you assess your planning for continuous professional development and tracking digital trends?				
a) I can reflect critically on digital experiences for future development.	3	4	4	3.67
b) I can monitor future digital trends.	3	3	4	3.33
c) I can use new digital tools to improve own knowledge and skills.	3	3	5	3.67
d) I can use appropriate tools for reflection.	3	3	4	3.33
Mean for Strand 7 of each participant	**3.00**	**3.25**	**4.25**	**3.50**
Total Mean for all strands of DLT of each participant	**2.80**	**3.68**	**4.26**	**3.60**

APPENDIX F

STUDENT SURVEY RESULTS

Questions	n=total number M=mean for all responses
BACKGROUND INFORMATION 1. Please write your course code or course name:	
English for Communication 2 (HG010)	n=28, 48.28%
Science and Technology Translation (HR340)	n=23, 39.66%
English from the Media (HR334)	n=7, 12.07%
2.What is your gender?	
Male	n=20, 34.48%
Female	n=38, 65.52%
3. How old are you?	
19 years old	n=19, 32.76%
20	n=8, 13.79%
21	n=15, 35.86%
22	n=10, 17.24%
23	n=3, 5.17%
25	n=2, 3.45%
27	n=1, 1.72%
4. What is your program/ major of study?	
Faculty of Humanities and Applied Arts	n=57, 98.28%
Japanese	n=28, 48.28%
English	n=29, 50%
Faculty of Business Administration: Logistics	n=1, 1.72%
5. What is your academic level?	
Freshman	n=28, 48.28%
Sophomore	n=0
Junior	n=21, 36.21%
Senior	n=9, 15.52%
TECHNOLOGY PROFICIENCY 6. Generally, what is your skill level as a user of desktop /laptop computers compared to typical undergraduate students? Much Lower (1) Lower (2) Average (3) Higher (4) Much Higher (5)	M=3.26
7. Generally, what is your skill level as a user of desktop/laptop computers compared to people around the age of 50? Much Lower (1) Lower (2) Average (3) Higher (4) Much Higher (5)	M=4.37

8. How often do you access iTunes U courses? Never (1) Once a week (2) 2-3 times per week (3) 4-5 times per week (4) Every day (5)	M=3.51
9. What do you usually do on iTunes U? (Please specify)	Open response
10. What is the most frequent thing (app / tool) you use your mobile device for when learning a language? Please DO NOT include ITunes U.	Open response
11. What is the most frequent thing (app / tool) you use your mobile device to do for fun? Please DO NOT include "talking on the phone".	Open response
Technology use for academic purposes 12. Please circle the position on the continuum that best describes your technology use in learning English Never (1) Seldom (2) Sometimes (3) Frequently (4) Always (5)	
a) I use the Internet to get access to news and videos in English.	M=3.66
b) I use iPads to help me learn English.	M=3.60
c) I use iTunes U course to read materials, do assignments and view the test score	M=3.84
d) I use mobile apps for learning (e.g., online dictionary)	M=4.05
e) I use social network sites for language learning (e.g., Duolingo)	M=3.04
f) I use Wikis in learning English.	M=2.62
g) I use web blogs to improve my writing in English.	M=2.48
h) I use emails to communicate with teachers in English.	M=2.43
i) I use Twitter to learn English.	M=2.78
j) I use Instagram to learn English.	M=2.88
k) I use Skype to communicate with teachers and classmates in English.	M=1.74
l) I use LINE chat app for learning (e.g., communicate with teachers and participate in group discussions)	M=2.81
m) I use Facebook to learn English and communicate with teachers.	M=3.33
n) I use virtual games (e.g., Second Life, World of Warcraft) to improve my English.	M=2.95
o) I use Pinterest to learn English.	M=2.38
p) I watch YouTube videos to learn English.	M=4.10
Mean	**3.04**
Technology use for non-academic purposes 13. Please circle the position on the continuum that best describes your technology use for fun. Never (1) Seldom (2) Sometimes (3) Frequently (4) Always (5)	
a) I surf the web for fun to find interesting things to read and watch videos and listen to music.	M=4.86

b) I use iTunes U course to find books to read for fun.	M=2.74
c) I use mobile apps for living and fun.	M=4.47
d) I use emails to communicate with family and friends.	M=2.16
e) I read and write on the Wikis for fun.	M=2.52
f) I use blogs for fun.	M=2.60
g) I use Twitter for fun.	M=3.47
h) I use Instagram for fun with family and friends.	M=3.91
i) I use Skype for fun and communication with family and friends.	M=1.63
j) I use LINE chat app for fun and communication with family and friends.	M=4.37
k) I use Facebook for fun and communication with family and friends.	M=4.21
l) I play virtual games (e.g., Second Life, World of Warcraft).	M=4.02
m) I use Pinterest for fun.	M=2.48
n) I watch YouTube videos for fun.	M=4.70
Mean	**3.44**
14. Explain in detail in the space below how you would define digital literacy.	Open response
15. Please indicate your level of digital literacy (according to your own understanding of this term). Very low (1) Low (2) Medium (3) High (4)Very High (5)	M=3.51
16. Please indicate your ability to do the following. On a scale of 1 to 5 to indicate how difficult or easy it is very difficult (1) difficult (2) average (3) easy (4) very easy (5)	
a) Type English texts.	M=3.53
b) Create a multimedia PowerPoint presentation.	M=3.62
c) Upload a video to YouTube.	M=3.50
d) Use the main features of Facebook.	M=4.28
e) Use the main features of Twitter.	M=3.69
f) Use the main features of Line.	M=4.33
g) Use the main features of Instagram.	M=4.00
h) Use a search engine (Google, Safari).	M=4.72
i) Create/ send / receive phone text messages.	M=4.09
j) Take photos and record videos with smartphones.	M=4.53
k) Download and use mobile phone apps.	M=4.67
l) Use computer programming to create software.	M=2.07
m) Decide if online information is accurate.	M=3.62
n) Identify the original source of online information.	M=3.66
o) Determine the viewpoint/bias of online information	M=3.79
Mean	**3.89**
17. In your opinion, should social media or technology be integrated into English language curriculum? Why or why not?	
Yes	n=58, 100%
No	n=0

18. Is it important for you to receive digital literacy instruction for learning English?	
Yes	n=40, 69%
No	n=18, 31%
19. How often do you create projects that use videos, music, images for school and work? Never (1) Seldom (2) Sometimes (3) Frequently (4) Always (5)	M=2.79
20. How often do you create projects that use videos, music, images for fun in your free time? Never (1) Seldom (2) Sometimes (3) Frequently (4) Always (5)	M=2.67

APPENDIX G

SAMPLE TEACHER INTERVIEW QUESTIONS

These open-ended questions will be randomly selected as follow-up questions for individual teacher interviews in about weeks 4 and 8.

Session 1: Week 4

1. Describe your academic background.
2. Describe your teaching styles and classroom management.
3. Describe your assessment practices.
4. Describe students' role in your class.
5. Describe your good qualities you bring to work as an English teacher.
6. Describe how you feel that you are perceived and assessed by faculty in your department.
7. Describe the technology role in your class.
8. Describe years of experience in using an iPad or other digital technologies.
9. Describe your technology trainings and workshops you attended.
10. Describe your academic community in your university.
11. Describe what digital technologies you use digital technologies for academic and non-academic purposes and how you use them.
12. Describe how you use social media (i.e., Twitter, Instagram, Facebook, blogs, Google Docs) in teaching and personal life.
13. Describe how your students use digital technologies and social media for academic and non-academic purposes.
14. Describe how you apply technologies into teaching based on your assumptions of students' technology use.
15. Describe your understanding about 'digital literacies'.
16. Describe how much you rate yourself as a digitally literate compared to your students and other teachers.
17. Describe what skills teachers need to teach 'digital students' in the digital age.
18. Describe your comfort and confidence in using digital technologies for living, learning and teaching.
19. Describe your student assessment related to technology use.
20. Describe the potentials of integrating digital technologies in teaching.
21. Describe the three most important challenges you may face/have faced in your iPad—enhanced language teaching and how you will address/have addressed these;
    a. Teaching approach
    b. Classroom management
    c. School environment; facilities, convenience, Internet access, Wi-Fi
22. Describe skills, knowledge and understandings you hope to develop for professionalism.

Session 2: Week 8

1. Describe your satisfaction of technology integration in this class.
2. Describe the benefits and barriers of using technologies in this class.
3. Describe how you solve the problems about technology challenges.
4. Describe some suggestions to develop digital literacies for teachers.

5. Describe some support or professional development trainings or workshops you would like to have.
6. Describe a possibility you will increasingly integrate technology to your curriculum.
7. Describe your feedback on various technological resources and activities recommended to develop teachers' digital literacy skills.
    a. having a technological mentor
    b. keeping a teacher blog
    c. designing a digital storytelling project,
    d. creating a teacher website
    e. forming a community of practice for sharing technological knowledge and digital skills
    f. forming a LINE group
    g. having a Facebook page

APPENDIX H

SAMPLE STUDENT FOCUS GROUP QUESTIONS

These following open-ended questions will be used for the student focus group discussions in week 8 (adapted from Rossing et al. (2012), p.6).

1. What digital technologies do you often use for learning?
2. How do you use technologies for learning and personal life?
3. How was your experience in using with iPad-enhanced language learning?
4. Are you comfortable with using digital technologies?
5. What did you like most and least about iPad-enhanced language learning?
6. What was your expectation of using iPads in this class?
7. What was the challenges in using iPads and other technologies for learning?
8. How did technology help or limit your learning in this class?
9. Do you think technologies should be integrated in this class?
10. What do you think about the teachers' competence in using technologies?
11. What would you like the teacher to change about technology usage?
12. What are your suggestions in using iPads and other technologies more effectively in the future class?

APPENDIX I

LESSON PLAN OF DIGITAL STORY CREATION

Topic: Creating a Digital Story
Lesson Duration: 6 hours
Level: Intermediate level of English writing and speaking skills and technology skills of using audio or video recording and editing software

Rationale:

Digital stories have proved to help develop creative and critical thinking from designing a multimedia short film clip. Thus, it can modernize teaching methods, increase motivation and develop digital literacies of teachers by hands-on experience in creating a short video. Later, teachers will be confident to supervise students to create digital storytelling as a project work for their course. This technology-enhanced language learning activity can be innovative.

Lesson Objectives:

Teachers will make a multimedia digital story that combines texts, images and audio files. The final product is a 3-5-minute film clip. This activity is aimed to develop teachers' digital technology skills. To complete a digital storytelling project, teachers require a number of steps from writing a narrative story to uploading a final product to YouTube. Two main skills involved are writing skills and functional skills of using video-making software.

Summary of Tasks / Actions: Formal process for creating a digital story.

1. Script development: write the story
2. Record and edit the audio
3. Make a story board
4. Capture and process the images to illustrate the story (image scanning and editing)
5. Combine the audio and images
6. Add background Music
7. Add titles, transitions, and effects
8. Let friends view the Digital Story and be open to suggestions to improve it
9. Upload your story to YouTube

Questions for reflection

1. Does your Digital Story fit any time limits?
2. Does your Digital Story work for you?
3. Does the voice fit in the right footage?
4. Does the music work for the footage selected?
5. Is the music level higher/lower than your voice?

Materials / Tools:

1. Computer
2. Software, e.g., iMovie or MS Movie Maker
3. Scanner
4. Smartphone for taking photos and recording videos
5. Digital Music
6. Microphone

Examples of Digital Stories

1. Howard and Ana Conquer Mt. Fuji
2. Aquarius: the Water Carrier
3. University of Houston: The Educational Uses of Digital Storytelling

References:

Christopher Johnson's teaching materials: ETCV 511

Robin, B. (2018). Digital storytelling lesson plans. Retrieved from https://sites.google.com/site/digitizeww/digital-storytelling-lesson

Teacher Notes: Before the workshop, the teacher participants are expected to finish their script writing.

REFERENCES

Amir, Z., Ismail, K., & Hussin, S. (2011). Blogs in language learning: Maximizing students' collaborative writing. *Procedia-Social and Behavioral Sciences*, *18*, 537-543.

Anderson, P. (2007) What is Web 2.0? Ideas, Technologies and Implications for Education. JISC: Bristol, URL

Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & education*, *52*(1), 154-168.

Archambault, L. M., & Barnett, J. H. (2010). Revisiting technological pedagogical content knowledge: Exploring the TPACK framework. *Computers & Education*, *55*(4), 1656-1662.

Archambault, L., & Crippen, K. (2009). Examining TPACK among K-12 online distance educators in the United States. *Contemporary issues in technology and teacher education*, *9*(1), 71-88.

Autodesk, (2016). The Ministry of Science and Technology, NSTDA, and Autodesk Join Hands to Advance Digital Manufacturing in Thailand. Retrieved from http://news.autodesk.com/press-release/ministry-science-and-technology-nstda-and-autodesk-join-hands-advance-digital-manufact

Avidov-Ungar, O., & Eshet-Alkalai, Y. (2014). TPACK revisited: A systemic perspective on measures for predicting effective integration of innovative technologies in school systems. *Journal of Cognitive Education and Psychology*, *13*(1), 19-31.

Baker, W., & Jarunthawatchai, W. (2017). English language policy in Thailand. *European Journal of Language Policy*, *9*(1), 27-44.

Baran, E. (2014). A review of research on mobile learning in teacher education. *Journal of Educational Technology & Society*, *17*(4), 17.

Bates, T. (2015). *Teaching in a digital age: Guidelines for designing teaching and learning for a digital age*. Tony Bates Associates.

Bawden, D. (2001). Information and digital literacies: a review of concepts. *Journal of documentation*, *57*(2), 218-259.

Bawden, D. (2008). Origins and concepts of digital literacy. *Digital literacies: Concepts, policies and practices*, *30*, 17-32.

Becker, S. A., Cummins, M., Davis, A., Freeman, A., Hall, C. G., & Ananthanarayanan, V. (2017). *NMC horizon report: 2017 higher education edition* (pp. 1-60). The New Media Consortium.

Berque, D., Bonebright, T., & Whitesell, M. (2004). Using pen-based computers across the computer science curriculum. *ACM SIGCSE Bulletin*, *36*(1), 61-65.

Blake, R. (2016). Technology and the four skills. *Language Learning & Technology, 20*(2), 129-142. Retrieved from http://llt.msu.edu/issues/june2016/blake.pdf

Bunyakiati, P., & Voravittayathorn, P. (2013). Applying UTCC Hybrid Learning in the Designing of a Learning Framework for Students with Disabilities and High-Potential Students. *University of the Thai Chamber of Commerce Journal*, *33*(3).

Castek, J., Coiro, J., Hartman, D., Henry, L., Leu, D., & Zawilinski, L. (2007). Thinking about our future as researchers: New literacies, new challenges, and new opportunities. *The twenty-eighth yearbook of the College Reading Association*, 31-50.

Cervetti, G., Damico, J., & Pearson, P. D. (2006). Multiple literacies, new literacies, and teacher education. *Theory into practice*, *45*(4), 378-386.

Castaneda, M. E. (2013). I am proud that I did it and it's a piece of me": Digital storytelling in the foreign language classroom. *CALICO Journal*, *30*(1), 44-62.

Chai, C. S., Koh, J. H. L., & Tsai, C. C. (2010). Facilitating preservice teachers' development of technological, pedagogical, and content knowledge (TPACK). *Educational Technology & Society*, *13*(4), 63-73.

Chen, C. M., & Tsai, Y. N. (2009, July). Interactive location-based game for supporting effective English learning. In *Environmental Science and Information Application Technology, 2009. ESIAT 2009. International Conference, 3*, 523-526. IEEE.

Chen, H. I. (2013). Identity practices of multilingual writers in social networking spaces. *Language Learning & Technology, 17*(2), 143-170. Retrieved from http://llt.msu.edu/issues/june2013/chen.pdf

Childress, R. (2014). Best Practices in Integrating Technology Across New CAEP Standards for Accrediting Initial Teacher Educator Preparation Providers (EPP). In J. Viteli & M. Leikomaa (Eds.), *Proceedings of EdMedia 2014--World Conference on Educational Media and Technology* (pp. 102-105). Tampere, Finland: Association for the Advancement of Computing in Education (AACE). Retrieved April 15, 2018 from https://www.learntechlib.org/p/147489/.

Chun, D., Kern, R., & Smith, B. (2016). Technology in language use, language teaching, and language learning. *Modern Language Journal, 100*, 64-80.

Cochrane, T., Narayan, V., & Oldfield, J. (2013). iPadagogy: Appropriating the iPad within pedagogical contexts. *International Journal of Mobile Learning and Organisation*, *7*(1), 48-65.

Culén, A. L., & Gasparini, A. (2011). iPad: A new classroom technology? A report from two pilot studies. *INFuture Proceedings*, 199-208.

Comas-Quinn, A., Mardomingo, R., & Valentine, C. (2009). Mobile blogs in language learning: Making the most of informal and situated learning opportunities. *ReCALL*, *21*(1), 96-112.

Cope, B., & Kalantzis, M. (2009). "Multiliteracies": New literacies, new learning. *Pedagogies: An international journal*, *4*(3), 164-195.

Ducate, L. C., & Lomicka, L. L. (2008). Adventures in the blogosphere: From blog readers to blog writers. *Computer Assisted Language Learning*, *21*(1), 9-28.

Dudeney, G., Hockly, N., & Pegrum, M. (2013). *Digital literacies: Research and resources in language teaching*. NJ: Pearson.

Elias, T. (2011). Universal instructional design principles for mobile learning. *The International Review of Research in Open and Distributed Learning, 12*(2), 143-156.

Erstad, O., Eickelmann, B., & Eichhorn, K. (2015). Preparing teachers for schooling in the digital age: A meta-perspective on existing strategies and future challenges. *Education and Information Technologies*, *20*(4), 641-654.

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, *59*(2), 423-435.

Eshet-Alkalai, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia*, *13*(1), 93.

Eyal, L. (2012). Digital assessment literacy--the core role of the teacher in a digital environment. *Journal of Educational Technology & Society*, *15*(2), 37.

Fellner, T., & Apple, M. (2006). Developing writing fluency and lexical complexity with blogs. *The jalt call Journal*, *2*(1), 15-26.

Foroutan, M., Noordin, N., & bin Hamzah, M. S. G. (2013). Weblog promotes ESL learners' writing autonomy. *Journal of Language Teaching and Research, 4*(5).

Garcia-Martin, J., & Garcia-Sanchez, J. N. (2017). Pre-service teachers' perceptions of the competence dimensions of digital literacy and of psychological and educational measures. *Computers & Education*, *107*, 54-67.

Gedik, N., Hanci-Karademirci, A., Kursun, E., & Cagiltay, K. (2012). Key instructional design issues in a cellular phone-based mobile learning project. *Computers & Education*, *58*(4), 1149-1159.

Gillen, J. (2014). *Digital literacies*. Routledge.

Gillen, J. & Barton, D. (2010). *Digital literacies: A research briefing by the technology enhanced learning phase of the Teaching and Learning Research Programme.* London: London Knowledge Lab, University of London. Retrieved from http://www.tlrp.org/docs/DigitalLiteracies.pdf.

Gonglewski, M., & DuBravac, S. (2006). Multiliteracy: Second language literacy in the multimedia environment. *Calling on CALL: From theory and research to new directions in foreign language teaching*, 43-68.

Graham, C. R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers & Education*, *57*(3), 1953-1960.

Graham, C. R., Borup, J., & Smith, N. B. (2012). Using TPACK as a framework to understand teacher candidates' technology integration decisions. *Journal of Computer Assisted Learning*, *28*(6), 530-546.

Graham, C. R., Burgoyne, N., Cantrell, P., Smith, L., St. Clair, L., & Harris, R. (2009). TPACK development in science teaching: Measuring the TPACK confidence of inservice science teachers. TechTrends, 53(5), 70–79.

Grajek, S. (2015). *Higher education's top 10 strategic technologies for 2015* (Vol. 75, p. 12). Research report. Louisville, CO: ECAR, January 2015. http://www. educause. edu/ecar. 2015 EDUCAUSE. CC by-nc-nd.

Hafner, C. A. (2013). Digital composition in a second or foreign language. *TESOL Quarterly*, *47*(4), 830-834.

Hafner, C. A., Chik, A., & Jones, R. H. (2013). Engaging with digital literacies in TESOL. *TESOL Quarterly*, *47*(4), 812-815.

Hafner, C. A., & Miller, L. (2011). Fostering learner autonomy in English for science: A collaborative digital video project in a technological learning environment. *Language Learning & Technology*, *15*(3), 68-86.

Hague, C., & Payton, S. (2010). *Digital literacy across the curriculum*. Futurelab.

Hargis, J., Cavanaugh, C., Kamali, T., & Soto, M. (2014). A federal higher education iPad mobile learning initiative: Triangulation of data to determine early effectiveness. *Innovative Higher Education*, *39*(1), 45-57.

Haydn, T. A., & Barton, R. (2007). Common needs and different agendas: How trainee teachers make progress in their ability to use ICT in subject teaching. Some lessons from the UK. *Computers & Education*, *49*(4), 1018-1036.

Healey, D. (2018). TESOL technology standards. *The TESOL Encyclopedia of English Language Teaching*, 1-6.

Hongprayoon, K. (2016). *Industry 4.0: is Thailand ready for it?* Retrieved from http://www.bangkokpost.com/opinion/opinion/1130517/industry-4-0-is-thailand-ready-for-it.

Huffaker, D. (2009). Let them blog: Using weblogs to advance literacy in the K-12 classroom. In C. Ang & P. Zaphiris, *Human computer interaction: Concepts, methodologies, tools and applications*. Hershey, PA: IGI Global. Retrieved from http://ezproxy2.library.arizona.edu/login?url=http://literati.credoreference.com/content/entry/igihci/let_them_blog_using_weblogs_to_advance_literacy_in_the_k_12_classroom/0

Hughes, M., & Daykin, N. (2002). Towards Constructivism: Investigating Students' Perceptions and Learning as a Result of Using an Online Environment. *Innovations in Education and Teaching International*, *volume 39 (3),* 217. doi: 10.1080/1355800021015003 6

Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *The Reading Teacher, 66*(1), 15-23. Retrieved from http://www.jstor.org.ezproxy3.library.arizona.edu/stable/23321264

Hutchison, A., & Reinking, D. (2011). Teachers' perceptions of integrating information and communication technologies into literacy instruction: A national survey in the United States. *Reading Research Quarterly*, *46*(4), 312-333.

Hwang, G. J., & Chang, H. F. (2011). A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students. *Computers & Education*, *56*(4), 1023-1031.

Hwang, G. J., & Chang, S. C. (2015). Effects of a peer competition- based mobile learning approach on students' affective domain exhibition in social studies courses. *British Journal of Educational Technology*.

Inan, F. A., & Lowther, D. L. (2010). Factors affecting technology integration in K-12 classrooms: A path model. *Educational Technology Research and Development*, *58*(2), 137-154.

Iyer, P. (2013). Effects of collaborative blogging on communicative skills in writing of Thai University EFL students. *English for Specific Purposes World*, *14*(39), 1-14.

Jenkins, H., Purushotma, R., Weigel, M., Clinton, K., & Robison, A. J. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. Mit Press.

Jivaketu, P. (2015). *An evaluation of teacher development in using technology during the first decade of Thai Education Reform 1999–2009* (Doctoral dissertation, Boston University).

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2015). *The NMC Horizon Report: 2015 Higher Education Edition*. New Media Consortium.

Jones, R. H., & Hafner, C. A. (2012). *Understanding digital literacies: A practical introduction*. Routledge.

Jongsermtrakoon, S., & Nasongkhla, J. (2015). A Group Investigation Learning System for Open Educational Resources to Enhance Student Teachers' Digital Literacy and Awareness in Information Ethics. *International Journal of Information and Education Technology*, *5*(10), 783.

Karabulut, A., Levelle, K., Li, J., & Suvorov, R. (2012). Technology for French learning: A mismatch between expectations and reality. *CALICO Journal*, *29*(2), 341-366.

Kay, R. H. (2006). Evaluating strategies used to incorporate technology into preservice education: A review of the literature. *Journal of Research on Technology in Education*, 38(4), 383–408.

Kearney, M., Burden, K., & Rai, T. (2015). Investigating teachers' adoption of signature mobile pedagogies. *Computers & Education*, *80*, 48-57.

Kennistnet (2011). Four in balance monitor 2010. ICT in Dutch schools. The Netherlands. Retrieved from http://downloads.kennisnet.nl/algemeen/Vier-in-balans-monitor-2011-Engelse-versie-internet.pdf on 20th Aug 2015.

Kern, R. (2014). Technology as Pharmakon: The promise and perils of the internet for foreign language education. *The Modern Language Journal*, *98*(1), 340-357.

Kessler, G. (2013a). Collaborative language learning in co-constructed participatory culture. *Calico Journal*, *30*(3), 307.

Kessler, G. (2013b). Teaching ESL/EFL in a World of Social Media, Mash- Ups, and Hyper- Collaboration. *TESOL Journal*, *4*(4), 615-632.

Kessler, G., Bikowski, D., & Boggs, J. (2012). Collaborative writing among second language learners in academic web-based projects. *Language Learning & Technology*, *16*(1), 91-109.

Khamkhien, A. (2012). Computer assisted language learning and English language teaching in Thailand: Overview. *Mediterranean Journal of Social Sciences*, *3*(1), 55-64.

Kihoza, P., Zlotnikova, I., Bada, J., & Kalegele, K. (2016). Classroom ICT integration in Tanzania: Opportunities and challenges from the perspectives of TPACK and SAMR models. *International Journal of Education and Development Using Information and Communication Technology*, *12*(1), 107-128.

King, B. W. (2015). Wikipedia writing as praxis: Computer-mediated socialization of second-language writers. *Language Learning & Technology, 19*(3), 106-123. Retrieved from http://llt.msu.edu/issues/october2015/king.pdf

Kitchakarn, O. (2013). Peer feedback through blogs: An effective tool for improving students' writing abilities. *Turkish Online Journal of Distance Education*, *14*(3).

Kim, H. J., Park, J. H., Yoo, S., & Kim, H. (2016). Fostering creativity in tablet-based interactive classrooms. *Educational Technology & Society, 19*(3)*,* 207-220.

Kinash, S., Brand, J., & Mathew, T. (2012). Challenging mobile learning discourse through research: Student perceptions of Blackboard Mobile Learn and iPads. *Australasian Journal of Educational Technology*, *28*(4).

Knobel, M., & Lankshear, C. (2008). Digital literacy and participation in online social networking spaces. *Digital literacies: Concepts, policies and practices*, 249-278.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, *9*(1), 60-70.

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)?. *Journal of Education*, *193*(3), 13-19.

Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., & Graham, C. R. (2014). The technological pedagogical content knowledge framework. In *Handbook of research on educational communications and technology* (pp. 101-111). Springer New York

Koehler, M. J., Shin, T. S., & Mishra, P. (2012). How do we measure TPACK? Let me count the ways. In *Educational technology, teacher knowledge, and classroom impact: A research handbook on frameworks and approaches* (pp. 16-31). IGI Global.

Koh, J. H. L., Chai, C. S., Wong, B., & Hong, H.- Y. (2015). Technological Pedagogical Content Knowledge (TPACK) and design thinking: A framework to support ICT lesson design for 21st century learning. *The Asia-Pacific Education Researcher, 24*(3), 535- 543. http://dx.doi.org/10.1007/s40299-015-0237-2

Koh, J. H., & Divaharan, H. (2011). Developing pre-service teachers' technology integration expertise through the TPACK-developing instructional model. *Journal of Educational Computing Research*, *44*(1), 35-58.

Kope, M. (2006). Understanding E- literacies. In Martin, A., & Madigan, D. (2006). Digital literacies for learning. Library Association Publishing.

Kramsch, C. (2014). Teaching foreign languages in an era of globalization: Introduction. *The Modern Language Journal*, *98*(1), 296-311.

Kramsch, C., A'Ness, F., & Lam, E. (2001). *Technology, language and literacy: The new pedagogical challenge*. na.

Kukulska-Hulme, A. (2009). Will mobile learning change language learning?. *ReCALL*, *21*(2), 157-165.

Kucer, S. B. (2014). Dimensions of literacy: A conceptual base for teaching reading and writing in school settings (4th ed.). New York, NY: Routledge.

Lakarnchua, O., & Wasanasomsithi, P. (2013). WHAT IS SAID AND WHAT IS DONE: EFL Student Writers' Perceptions of Peer Feedback Through Blogs and Their Actual Use. *Turkish Online Journal of Distance Education*, *14*(4).

Lankshear, C. & Knobel, M. (2008). Digital literacy and participation in online social networking spaces. *Digital literacies: Concepts, policies and practices*, 249-278.

Lankshear, C. & Knobel, M. (2011). *New Literacies: Everyday Practices And Social Learning: Everyday Practices and Social Learning.* New York, NY: Open University Press.

Lee, J., Cerreto, F. A., & Lee, J. (2010). Theory of planned behavior and teachers' decisions regarding use of educational technology. *Educational Technology & Society*, *13*(1), 152-164.

Lee, L. (2010). Exploring wiki-mediated collaborative writing: A case study in an elementary Spanish course. *CALICO Journal*, *28*(2), 260-276.

Lee, L. (2012). Engaging study abroad students in intercultural learning through blogging and ethnographic interviews. *Foreign Language Annals*, *45*(1), 7-21.

Lehiste, P. (2015). The impact of a professional development program on in-service teachers' TPACK: a study from Estonia. *Problems of Education in the 21st Century*, *66*, 18-28.

Leu, D. J., Coiro, J., Castek, J., Hartman, D., Henry, L. A., & Reinking, D. (2008). Research on instruction and assessment in the new literacies of online reading comprehension. In C. C. Block & S. Parris (Eds.), Comprehension instruction: Research-based best practices. New York: Guilford Press.

Leu, D. J., Kinzer, C. K., Coiro, J. L., & Cammack, D. W. (2004). Toward a theory of new literacies emerging from the Internet and other information and communication technologies. *Theoretical models and processes of reading*, *5*(1), 1570-1613.

Liaw, M. L., & English, K. (2013). Online and offsite: Student-driven development of the Taiwan-France telecollaborative project Beyond these walls. In *Social networking for language education* (pp. 158-176). Palgrave Macmillan UK.

Literat, I. (2014). Measuring New Media Literacies: Towards the Development of a Comprehensive Assessment Tool. *Journal of Media Literacy Education*, *6*(1), 15-27.

Littlejohn, A., Beetham, H., & McGill, L. (2012). Learning at the digital frontier: a review of digital literacies in theory and practice. *Journal of computer assisted learning*, *28*(6), 547-556.

Lotherington, H., & Jenson, J. (2011). Teaching multimodal and digital literacy in L2 settings New literacies, new basics, new pedagogies. *Annual Review of Applied Linguistics 31*, 226-246.

Loveless, A., & Williamson, B. (2013). *Learning identities in a digital age: Rethinking creativity, education and technology*. Routledge.

Lu, M. (2008). Effectiveness of vocabulary learning via mobile phone. *Journal of computer assisted learning*, *24*(6), 515-525.

Maesincee, S. (2016). Thailand 4.0 value-based economy. Retrieved from https://www.slideshare.net/WorsakKanokNukulchai/thailand-40-valuebased-economy-by-dr-suvit-maesincee.

Mahdum, M. (2015). Technological Pedagogical and Content Knowledge (TPACK) of English Teachers in Pekanbaru, Riau, Indonesia. *Mediterranean Journal of Social Sciences*, *6*(5), 168.

Manuguerra, M., & Petocz, P. (2011). Promoting student engagement by integrating new technology into tertiary education: The role of the iPad. *Asian Social Science*, *7*(11), 61.

Martin, A., & Grudziecki, J. (2006). DigEuLit: concepts and tools for digital literacy development. *Innovation in Teaching And Learning in Information and Computer Sciences*, *5*(4), 1-19.

Marshall, C., & Rossman, G. B. (2015). *Designing Qualitative Research*, 6th ed. Los Angeles: Sage.

Marzano, R. J., & Heflebower, T. (2011). *Teaching & assessing 21st century skills*. Solution Tree Press.

Maxwell, J. A. (1996). *Qualitative research design: An interactive approach*. Thousand Oaks, CA: Sage.

Maxwell, J. A. (2012). *Qualitative research design: An interactive approach* (Vol. 41). Sage.
Technology & Society, 9 (2), 68-83.

McGrath, J., Karabas, G., & Willis, J. (2011). From TPACK concept to TPACK practice: An analysis of the suitability and usefulness of the concept as a guide in the real world of teacher development. *International Journal of Technology in Teaching & Learning*, *7*(1).

Melhuish, K. & Falloon, G. (2010). Looking to the future: M-learning with the iPad. Computers in New Zealand Schools: Learning, Leading, Technology, 22(3).

Michelson, K., & Dupuy, B. (2014). Multi-storied lives: Global simulation as an approach to developing multiliteracies in an intermediate French course. *L2 Journal*, *6*(1).

Militaru, G., Deselnicu, D., & Pollifroni, M. (2015). An exploratory study of student satisfaction: the moderating role of digital technologies. In *Proceedings of the International Management Conference, 9(1),* 234-241.

Mills, N. (2011). Situated learning through social networking communities: The development of joint enterprise, mutual engagement, and a shared repertoire. *Calico Journal*, *28*(2), 345-368.

Ministry of Information and Communication Technology. (2011). Executive Summary of Thailand ICT Policy Frame Work: Period 2011–2020 (ICT2020).

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, *108*(6), 1017.

Mishra, P., & Koehler, M. (2009). Too cool for school? No way! Using the TPACK framework: You can have your hot tools and teach with them, too. *Learning & Leading with Technology*, *36*(7), 14-18.

Miyazoe, T., & Anderson, T. (2010). Learning outcomes and students' perceptions of online writing: Simultaneous implementation of a forum, blog, and wiki in an EFL blended learning setting. *System*, *38*(2), 185-199.

Montero-Fleta, B., & Pérez-Sabater, C. (2010). A research on blogging as a platform to enhance language skills. *Procedia-Social and Behavioral Sciences*, *2*(2), 773-777.

National Standards Collaborative Board. (2015). World- readiness standards for learning languages. Retrieved from www.actfl.org/publications/all/national-standards-foreign-language-education.

Nguyen, L., Barton, S. M., & Nguyen, L. T. (2015). iPads in higher education—hype and hope. *British Journal of Educational Technology*, *46*(1), 190-203.

OECD/UNESCO. (2016). *Education in Thailand: An OECD-UNESCO Perspective*. Reviews of National Policies for Education. OECD Publishing, Paris. Retrieved from http://dx.doi.org/10.1787/9789264259119-en

Oskoz, A., & Elola, I. (2010). Meeting at the Wiki: The new arena for collaborative. *Web 2.0-Based E-Learning: Applying Social Informatics for Tertiary Teaching: Applying Social Informatics for Tertiary Teaching*, 209.

Oskoz, A., & Elola, I. (2014). Integrating digital stories in the writing class: Towards a 21st century literacy. *Digital literacies in foreign language education: Research, perspectives, and best practices*. San Marcos, TX: CALICO, 179-200.

Oskoz, A. & Elola, I. (2016). "Digital stories: Bringing multimodal texts to the Spanish writing classroom." *ReCALL*, 28(3), 326-342. doi: 10.1017/S0958344016000094.

Ozdamli, F., & Uzunboylu, H. (2015). M- learning adequacy and perceptions of students and teachers in secondary schools. *British Journal of Educational Technology*, *46*(1), 159-172.

Paesani, K., Willis Allen, H. Dupuy, B. (2015). *A multiliteracies framework for collegiate foreign language teaching.* Saddle River, NJ: Pearson.

Pamuk, S. (2012). Understanding preservice teachers' technology use through TPACK framework. *Journal of Computer Assisted Learning*, *28*(5), 425-439.

Pang, S., Reinking, D., Hutchison, A., & Ramey, D. (2015). South Korean teachers' perceptions of integrating information and communication technologies into literacy instruction. *Education Research International, 2015*, 1-13. doi:10.1155/2015/783593.

Payton, S., & Hague, C. (2010). *Digital literacy across the curriculum*. Futurelab.

Perez, O. A., Gonzalez, V., Pitcher, M. T., & Golding, P. (2011, June). Work in progress: analysis of mobile technology impact on STEM based courses; specifically introduction to engineering in the era of the iPad. In *118th ASEE Annual Conference and Exposition, Vancouver, BC, Canada*.

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the horizon*, *9*(5), 1-6.

Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment (CIE)*, *1*(1), 21-21.

Prensky, M. (2010). *Teaching digital natives: Partnering for real learning*. Corwin Press.

Reinhardt, J., & Nelson, B. K. (2004). Instructor use on online language learning resources: A survey of socio-institutional and motivational factors. *ReCALL*, *16*(2), 292-307.

Reinhardt, J., & Thorne, S. (2011). Beyond comparisons: Frameworks for developing digital L2 literacies. *Present and future promises of CALL: From theory and research to new directions in language teaching*, 257-280.

Reinhardt, J., & Thorne, S. (2016). Metaphors for digital games and language learning. *The Routledge handbook of language learning and technology*, 415-430.

Reinhardt, J., & Zander, V. (2011). Social networking in an intensive English program classroom: A language socialization perspective. *CALICO Journal, 28*(2), 326-344.

Riley, P. (2013). Teaching, learning, and living with iPads. *Music Educators Journal, 100*(1), 81-86. Retrieved from http://www.jstor.org.ezproxy3.library.arizona.edu/stable/43288776

Roblyer, M. D., McDaniel, M., Webb, M., Herman, J., & Witty, J. V. (2010). Findings on Facebook in higher education: A comparison of college faculty and student uses and perceptions of social networking sites. *The Internet and Higher Education*, *13*(3), 134-140.

Rossing, J. P., Miller, W. M., Cecil, A. K., & Stamper, S. E. (2012). iLearning: The future of higher education? Student perceptions on learning with mobile tablets. *Journal of the Scholarship of Teaching and Learning*, *12*(2), 1-26.

Rostami, M. A., Azarnoosh, M., & Abdolmanafi-Rokni, S. J. (2017). The effect of podcasting on Iranian EFL learners' motivation and attitude. *Theory and Practice in Language Studies*, *7*(1), 70+. Retrieved from http://go.galegroup.com.ezproxy2.library.arizona.edu/ps/i.do?p=AONE&sw=w&u=uarizonamain&v=2.1&it=r&id=GALE%7CA488510298&sid=summon&asid=55894f88e3dac5fbea769a38ae9ff0f7

Rowsell, J., Kosnik, C., & Beck, C. (2008). Fostering multiliteracies pedagogy through preservice teacher education. *Teaching Education*, *19*(2), 109-122.

Rowsell, J., Saudelli, M. G., Scott, R. M., & Bishop, A. (2013). iPads as placed resources: Forging community in online and offline spaces. *Language Arts*, *90*(5), 351-360.

Rowsell, J., & Walsh, M. (2011). Rethinking literacy education in new times: Multimodality, multiliteracies, & new literacies. *Brock Education Journal*, *21*(1).

Rukspollmuang, C. (2016) Adoption of Technology in the ASEAN Region: Education as a Key Driver for Digital Thailand. In *Selected Papers from the Asian Education Technology Conference* (p. 9).

Şad, S. N., & Göktaş, Ö. (2014). Preservice teachers' perceptions about using mobile phones and laptops in education as mobile learning tools. *British Journal of Educational Technology*, *45*(4), 606-618.

Sahin, I. (2011). Development of survey of technological pedagogical and content knowledge (TPACK). *Turkish Online Journal of Educational Technology-TOJET*, *10*(1), 97-105.

Sandberg, J., Maris, M., & de Geus, K. (2011). Mobile English learning: An evidence-based study with fifth graders. *Computers & Education*, *57*(1), 1334-1347.

Saran, M., Cagiltay, K., & Seferoglu, G. (2008). Use of mobile phones in language learning: Developing effective instructional materials. In *Wireless, Mobile, and Ubiquitous Technology in Education, 2008. WMUTE 2008. Fifth IEEE International Conference on* (pp. 39-43). IEEE.

Saudelli, M. G., & Ciampa, K. (2016). Exploring the role of TPACK and teacher self-efficacy: an ethnographic case study of three iPad language arts classes. *Technology, Pedagogy and Education*, *25*(2), 227-247.

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK) the development and validation of an assessment instrument for preservice teachers. *Journal of Research on Technology in Education*, *42*(2), 123-149.

Selwyn, N. (2012). Social media in higher education. *The Europa world of learning*, 1-10.

Seidman, I. (2013). *Interviewing as qualitative research*. New York: Teachers College Press.

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard educational review*, *57*(1), 1-23.

Sidani, S. (2017). *Examining the Use of Digital Technology by Four Literacy Teacher Educators* (Doctoral dissertation, University of Toronto (Canada)).

Siricharoen, W. V., & Siricharoen, N. (2012). Media and information literacy (MIL) for Thai youths. *World Academy of Science, Engineering and Technology, International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, *6*(7), 1897-1901.

Smith, C (2008). Teaching with Tablets at DePauw University retrieved from https://www.youtube.com/watch?v=m7uWrHKgxPQ

Statista (2018). Penetration of leading social networks in Thailand as of 3rd quarter 2017 retrieved from https://www.statista.com/statistics/284483/thailand-social-network-penetration/

Stockwell, G. (2007). Vocabulary on the move: Investigating an intelligent mobile phone-based vocabulary tutor. *Computer Assisted Language Learning*, *20*(4), 365-383.

Stergioulas, L. K., Ed, & Drenoyianni, H., Ed. (2011). *Pursuing digital literacy in compulsory education. new literacies and digital epistemologies. volume 43* Peter Lang New York.

Stockwell, G. (2007). Vocabulary on the move: Investigating an intelligent mobile phone-based vocabulary tutor. *Computer Assisted Language Learning*, *20*(4), 365-383.

Strickland, B., & O'Brien, M. G. (2013). A review of the literature on technology in second and foreign language learning. *The Language Research Centre at the University of Calgary*.

Summey, D. C. (2013). *Developing digital literacies: A framework for professional learning*. Thousand Oaks: Corwin.

Susko, D. M. (2015). *Teaching and learning with technology: how the best teacher education programs are preparing preservice teachers* (Doctoral dissertation).

Suthiwartnarueput, T., & Wasanasomsithi, P. (2012). Effects of using Facebook as a medium for discussions of English grammar and writing of low-intermediate EFL students. *Electronic Journal of Foreign Language Teaching*, *9*(2).

Tan, J. P. L., & McWilliam, E. (2009). From literacy to multiliteracies: Diverse learners and pedagogical practice. *Pedagogies: An International Journal*, *4*(3), 213-225.

Teo, T. (2008). Pre-service teachers' attitudes towards computer use: A Singapore survey. *Australasian Journal of Educational Technology*, *24*(4).

Theerathean, T., & Srikulwong, M. (2015). Pedagogy enhancement with mobile learning: A case study of the university of the Thai Chamber of Commerce. *The Second International Conference on Education Technologies and Computers (ICRTC 2015)*.

The New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard educational review*, *66*(1), 60-93.

Thorne, S. L. (2009). 'Community,' semiotic flows, and mediated contribution to activity. Language Teaching, 42, 81–94.

Thorne, S. L. (2013). Digital literacies. In M. Hawkins (Ed.), Framing Languages and Literacies: Socially Situated Views and Perspectives (pp. 192-218). New York: Routledge.

Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education*, *59*(1), 134-144.

Traxler, J. (2005). Defining mobile learning. In *IADIS International Conference Mobile Learning* (pp. 261-266).

UTCC Profile (2018). Apple Distinguished School. Retrieved from http://www.utcc.ac.th/index.php/schoolcolleges/AppleDistinguishedSchool

Van De Bogart, W. G. (2012, June). Developing Multi-literacy Skills in e-Learning Environments using Tablet Computers at the Primary Grade Level in Thailand. In *International e-Learning Conference 2012 (IEC2012)*.

Van De Bogart, W. G. (2014). Evaluating digital literacy skills of EFL Thai students' using LINE chat application. *Executive Journal*, *34*(1), 166-176.

Van Orden, S. (2006). Using a tablet PC in the German classroom to enliven teacher input. *Die Unterrichtspraxis/Teaching German*, 109-111.

Wang, B. T., Teng, C. W., & Chen, H. T. (2015). Using iPad to facilitate English vocabulary learning. *International Journal of Information and Education Technology*, *5*(2), 100-104.

Wang, S., & Vasquez, C. (2014). The effect of target language use in social media on intermediate-level Chinese language learners' writing performance. *CALICO Journal*, *31*(1), 78+.

White, J. (2015). *Digital literacy skills for FE teachers*. Thousand Oaks, California: SAGE/Learning Matters.

Williams., L., Abraham, L., & Bostelmann, E. D. (2014). A survey-driven study of the use of digital tools for language learning and teaching. *Digital Literacies in Foreign and Second Language Education, 29*(12), 42-67.

Willis Allen, H. W., & Paesani, K. (2010). Exploring the feasibility of a pedagogy of multiliteracies in introductory foreign language courses. *L2 Journal*, *2*(1).

Wong, L. H., Chin, C. K., Chee-Lay, T., & Liu, M. (2010). Students' personal and social meaning making in a Chinese idiom mobile learning environment. *Journal of Educational Technology & Society*, *13*(4), 15.

Wu, W. H., Wu, Y. C. J., Chen, C. Y., Kao, H. Y., Lin, C. H., & Huang, S. H. (2012). Review of trends from mobile learning studies: A meta-analysis. *Computers & Education*, *59*(2), 817-827.

Xu, Q., Dong, X., & Jiang, L. (2017). EFL Learners' Perceptions of Mobile- Assisted Feedback on Oral Production. *TESOL Quarterly*, *51*(2), 408-417.

Yunus, M. M., Tuan, J. L. K., & Salehi, H. (2013). Using blogs to promote writing skill in ESL classroom. *arXiv preprint arXiv:1305.6358*.

Zhao, Y. (2007). Social studies teachers' perspectives of technology integration. *Journal of Technology and Teacher Education*, *15* (3), 311-333.